THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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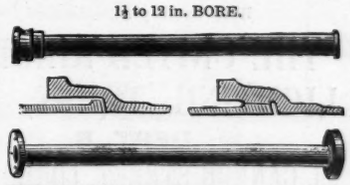

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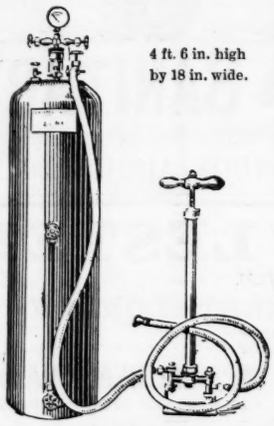

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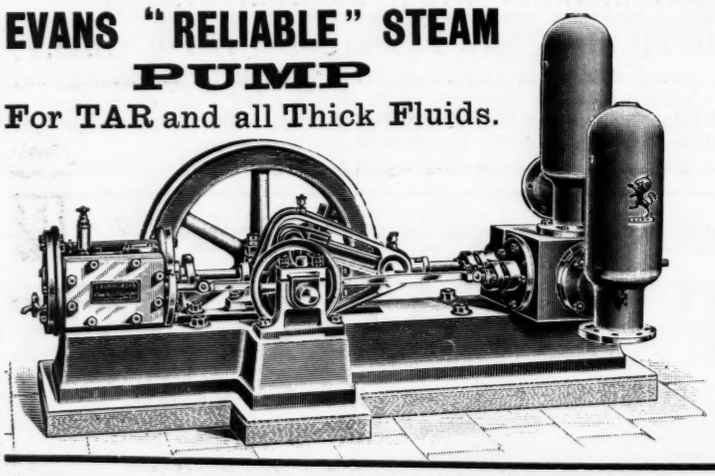

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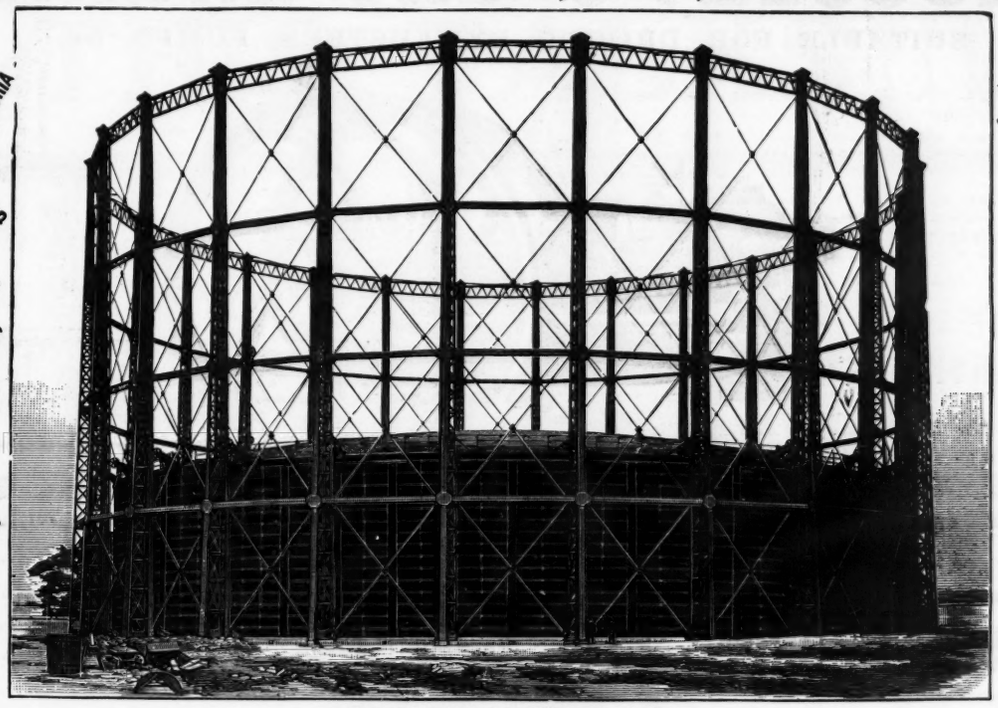

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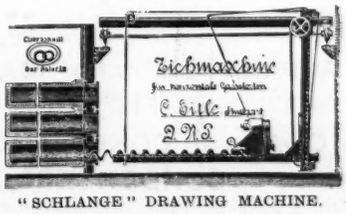

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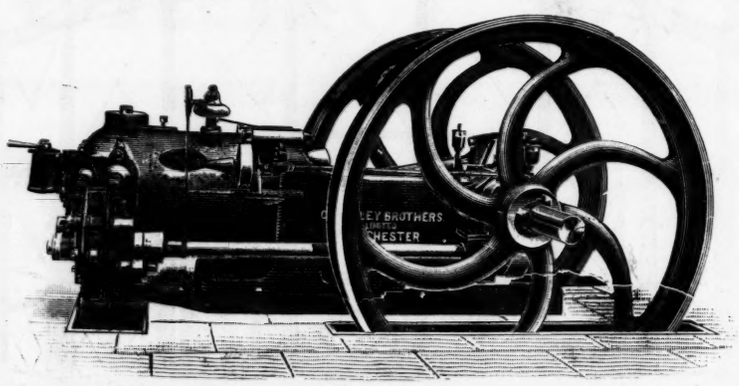

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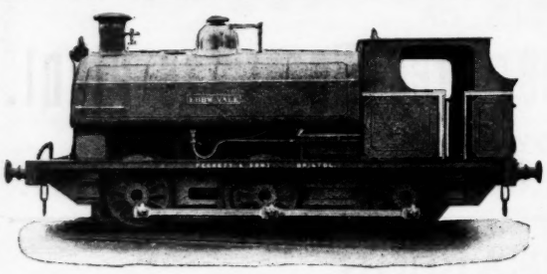

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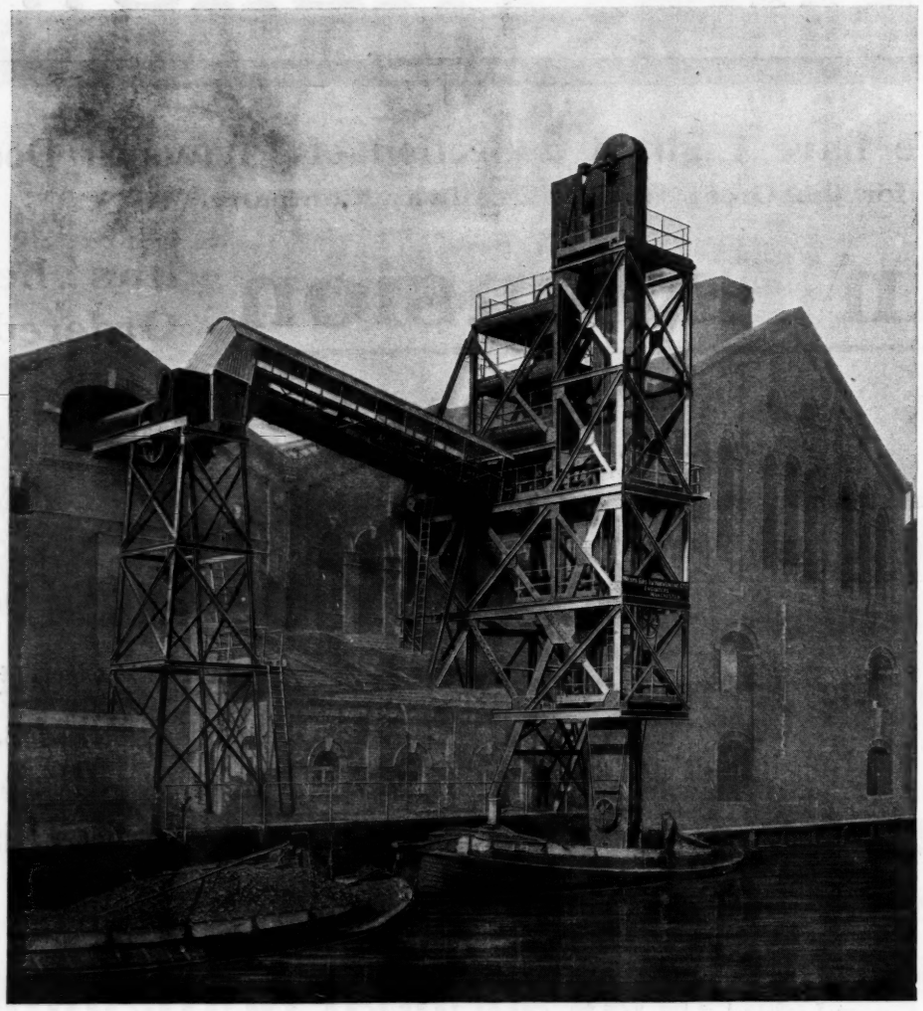

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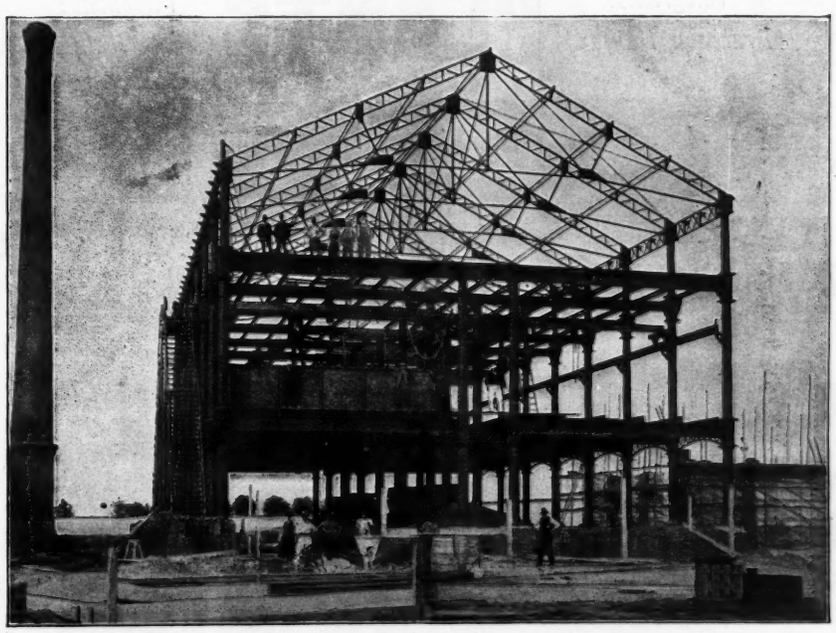

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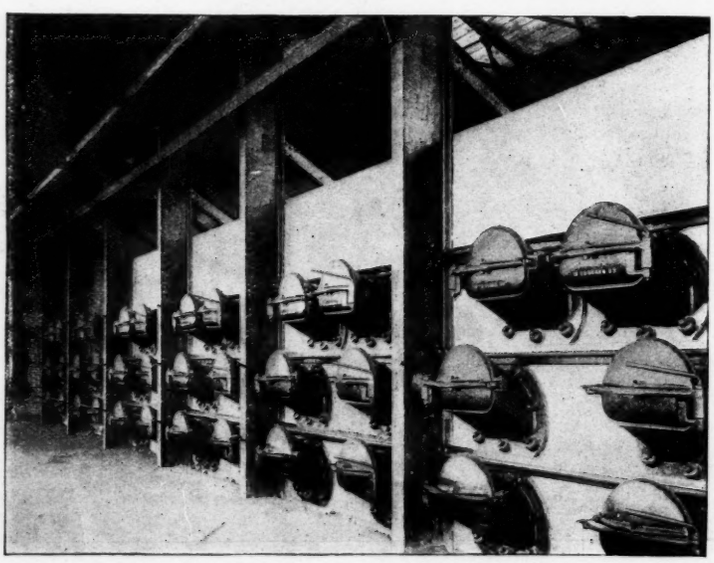

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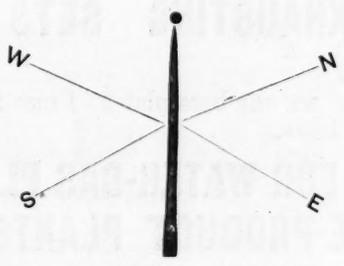

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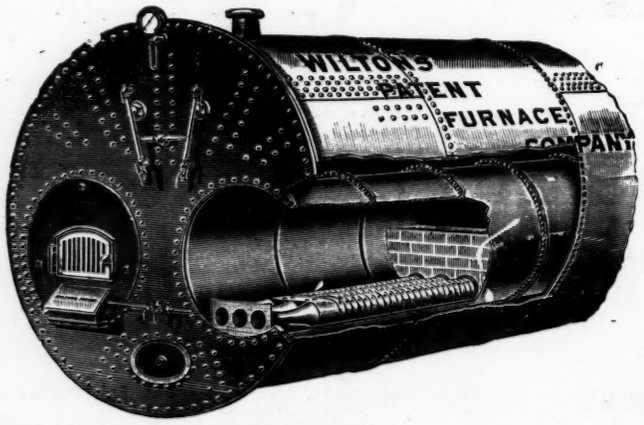

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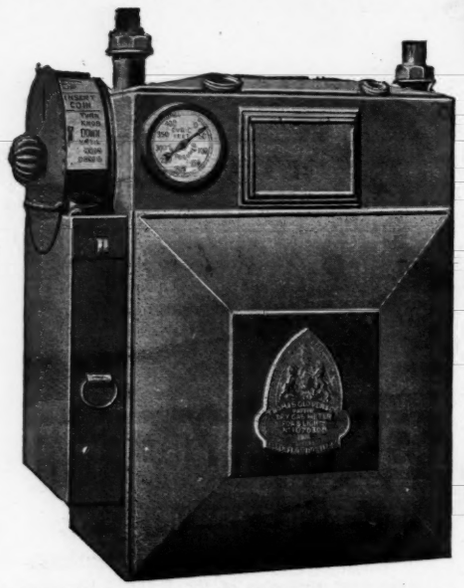

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

The Meeting of the British Association.

THE seventy-fourth session of the British Association—the Parliament of Science—which was brought to a close last Wednesday with a meeting in the Senate House, Cambridge, in which city the gathering took place, presented some noteworthy features, but little that was of special interest to readers of the "JOURNAL." The selection of the Prime Minister as President was sufficient to ensure a good attendance; and, as a matter of fact, the numbers were well above the average—indeed, many could not obtain admission to hear the introductory address. We shall probably be near the truth in saying that the majority would not have been very much wiser if they had done so; for a discourse on so abstruse a subject as that selected by Mr. Balfour would be "caviare to the general." His reflections on the new theory of matter were listened to with the attention becoming such an audience, and appreciated at their actual worth by those who were sufficiently familiar with modern investigation into the nature of the physical universe to enable them to follow the President's reasoning. He showed how the theories held towards the close of the eighteenth century had been modified by the development of the theory of the universal diffusion of ether through space, and by the discovery of the part played by electricity in Nature, constituting it, in the minds of the most advanced thinkers, the reality of which matter is the tangible expression. It was all vastly interesting as an abstract question; but to ordinary people, engaged in the practical business of life, and content to take the world as they find it, without troubling themselves over-much about how it came into existence—whether as the result of the operation of Infinite and Eternal Energy or of a First Great Cause—there are others of greater importance. For these people—and we confess to being of the number—it is the sectional work of the meetings of the Association that always claims most attention.

As far as our readers are concerned, the topics which specially appealed to them necessarily came before the Engineering Section; and their nature will be gathered from what appears in another part of the "JOURNAL" to-day. The President of the section (the Hon. Charles A. Parsons) selected for his address the subject of "Invention;" and he pointed out how the prominent inventions of last century in Science and the Arts had, in the widest sense, been among the greatest benefactors of the human race. Turning to the production of motive power, he reviewed the labours of the men who have devoted their energies to the improvement of internal combustion engines; and this led him to allude to the subject of the paper by Mr. E. Dugald Clerk to be submitted to the section, an abstract of which is given elsewhere. It will be seen therefrom that Mr. Clerk dealt with "Flame Temperature in Internal Combustion Motors," and described a method of reducing the maximum temperature while maintaining a mean pressure only reached with high temperatures—the idea being to increase the atmospheric pressure artificially. In the same section, Professor Harold B. Dixon discoursed on a topic which no one is more competent to handle than he—having been engaged for twenty years in investigating it—viz., "The Specific "Heat of Gases at High Temperatures;" and Professor Hopkinson followed with a paper on "Exhaust Gas Calori-"metry." Both of these contributions to the proceedings are shortly noticed elsewhere. Interesting as all these papers were, one read by Mr. Clifford C. Paterson, describing some investigations on the Harcourt 10-candle pentane lamp, carried out at the National Physical Laboratory, touched much more closely the every-day work of gas managers. Mr. Paterson's studies were undertaken to determine the change in the candle power of the lamp due to variation in barometric pressure and in the quantity of aqueous vapour present in the air. The paper was only a short one, and the full text is given elsewhere. It will be seen from it that a variation to the extent of 1 litre per cubic metre (0·0353 in 35·3 cubic feet) in the moisture causes a variation of about 0·7 per cent. in candle power, and 10 millimetres (0·4 inch) change in barometric pressure brings about an alteration of 0·8 per cent. in the illuminating power of the lamp.

Beyond the communications we have noticed, the 1904 meeting of the British Association was barren of subjects of immediate interest to the gas profession; and though the outcome of the discussions in certain of the sections was to unsettle what have always been regarded as well-established conclusions, and to lead to the conviction that the solution of scientific problems must henceforward be attempted from new standpoints and by fresh paths, the gas industry was not touched in any of its important details. If, as has been said, iconoclasm was the characteristic feature of the meeting, the class we represent need not fear its operation.

Chairmen's Addresses—New and Old Topics at Tottenham.

IT must have often crossed the minds of those who follow closely and regularly the proceedings at the half-yearly or the annual meetings of gas companies how tenaciously the chairmen, as a rule, cling to the time-honoured practice of making comparisons of the rise and fall of almost every item in the accounts. It is not a custom to be despised when the differences are worth notice, through some fortuitous, happy, or special circumstance. But the accounts of gas companies are, in most cases, so clearly set out in accordance with the model form—though that calls, in the changing conditions of the times, for certain emendations—that it is a simple matter for shareholders to make their own comparisons, and call for explanation on any items that strike them as unusual. For this reason, while the main features of the accounts should not be neglected by the Chair, it does appear a wretched waste of time, and is certainly tedious to the listeners, when chairmen will insist on citing all the differences in trivial financial items which go on their way rejoicing year after year in decremental or incremental changes of only a few pounds. This kind of thing always strikes us as padding and nothing more; and it suggests a lack of material through the poverty of the chairman in knowledge of, or interest in, what is going on in the outer world of the industry of which his undertaking, whether it be great or small, is an integrant.

A chairman's addresses to the assembled shareholders mark him as being either merely an ornament or something more. They bring to light whether he devotes attention to, and shapes from that attention his judgment upon, the many matters—and they are many just now—which may work good or ill if applied to the industry generally, or particularly to his and other undertakings. Happily, we have in the industry several such men, and not only among those professionally educated in the internal affairs and the methods of the industry. But, unfortunately, several though they be, they are of the minority. We wish it were otherwise; for then there would be more of that criticism and that expression of thought based on deliberate consideration which only now occasionally illuminate the reports of proceedings at meetings of shareholders. This is one reason why those who are skilled in the work of the industry are always able, when occupying the chair of a gas company, to make their speeches of interest not only to shareholders, but to those who have no concern in the purely domestic affairs of the undertaking. At the same time, it is well to have a good sprinkling of opinion from independent men, whose position should require of them a constant study of current gas topics, and whose views could be taken as the result of disinterested and of unprejudiced observation. To take a live interest in the political affairs of the industry, we hold to be as much a duty of a chairman as the exercise of control in the inner affairs of an undertaking. The former will make him a stronger man in performing the functions devolving upon him in the latter respect, and will

infuse into his addresses to the shareholders something far brighter than the results of exercises in subtraction.

Among the chairmen whose speeches are never wearisome or overladen with statistical comparisons, may be named the Chairman of the Tottenham and Edmonton Gas Company. But at the meeting on Thursday last, Mr. Corbet Woodall made a complete departure, and eschewed almost entirely comparisons bearing upon the working of the past half year. He had good reasons for doing this. In the first place, there was a special inspection by the proprietors of the large extensions and alterations of the works to follow the proceedings; and, in the second place, he had other topics which he desired to bring not only before those he was addressing, but before those who are interested generally in gas matters. Before directing attention to these, however, it will not be out of place to mention the unbroken continuity of progress in business which the Company have enjoyed now for many years past, and which—good as has been that of other Suburban Companies of about equal magnitude—has been almost, if not quite, without compare in its successive accumulations of consumption. Last half year alone displays an increase of 17·37 per cent., or 66,860,000 cubic feet, compared with the corresponding period of 1903. This kind of thing has naturally had a marked effect on the capital account; and yet, notwithstanding (to use the Chairman's own words), "the relation of capital to business is at the present time a "decreasing one." The requirement of more capital goes on unceasingly; and necessity has committed the Company to still further large expenditure. Upon all this, in the face of prosperity, the proprietors can, and do, look with equanimity. At the same time, in addition to capital expenditure, the great changes both inside and outside the works—including as they do large displacements and renewals—make an impression also on the revenue account. But the effect of this is accruing; and when things again approach a normal condition, it must be that both consumers and proprietors will share in the profits of the strength which is now being put into the undertaking.

In connection with the question of the large expenditure upon repairs and maintenance, Mr. Woodall and the Engineer (Mr. A. E. Broadberry) have been making an investigation; and the result is the production of some statistics of considerable interest. The Company's district is largely a residential one for the middle and working classes; and its rapid development in latter years is one of the secrets of the equally prolific accretions to the Company's business. We will not quote the figures here; but it will be seen from the report elsewhere how intimately work together the character of the population with the class of meter (ordinary or prepayment) fixed, and the connection and disconnection of meters. The new connections keep far ahead of the disconnections; but the magnitude of the latter shows the migratory tendency of the classes constituting the population in the extensive area of the Company. Supplementing these figures are others, among them being some referring to the complaints sent in by consumers, which indicate an average of only one complaint of short supply per consumer in 25 years; and then the cause is found to be "dirt, corrosion, "or water—never in recent years naphthalene." Coming from Mr. Woodall, the latter statement is significant; and it would have been of interest to have heard definitely from him whether he attributes this to the supply of carburetted water gas. "I do not know," says the Chairman, "how "these figures compare with those of any other company;" and this conveys an invitation to other companies to throw a comparative light on the interesting statistics advanced from the experiences of Tottenham. It may be hoped, for the sake of the instruction it would afford, that the invitation will not be neglected.

The last, but by no means the least important, part of the subject-matter composing the address which has to be noticed, is the criticism passed by Mr. Woodall on the statements in a circular which has obtained some notoriety, and stirred up an antagonism, which even its author, and his colleagues who endorsed it, we venture to think, did not anticipate. Duty demands the mention of Mr. Woodall's strictures; but further than that we are not called upon to go. There is, however, one point which must not be forgotten. Though the circular in question was only originally addressed to the consumers in the South Suburban Gas Company's district, by publication in the Press, and discussion of its contents at meetings of shareholders, the expressions of opinions therein on the subject of carburetted water gas have obtained a circulation, and possibly carried influence, far beyond the confines of the Company mentioned. Therefore—no matter what our own views may be on the general subject—the position which Mr. Woodall has held in the advocacy of that system of gas production (it may be said) compelled, though the task must have been quite out of sympathy with his tastes, a public expression of his feelings and views. His method of stating them, however, has introduced a personal element into the matter; and this, we fear, will only meet with approval or disapproval, according to the likes or dislikes of readers in regard to the primary subject of controversy. But Sir George Livesey and Mr. Corbet Woodall occupy such peculiar positions in the gas industry and in the affections and regard of those composing it, that no mere question of polemics in respect of a process or even administrative policy, must be engineered into a dispute to interfere with their friendship, or to constitute them as it were party leaders. The gas industry, however, will look for a reply to Mr. Woodall. There is only one man who can reply to the two most important assertions—as to "circumstances which could have been readily rectified," and "the only reputed failure [of the process], at least within "my knowledge, has been where, it would appear, success "has not been desired." These are serious statements, which must be dealt with (if at all) with a sense of the profound convictions of the engineer who uttered them.

A Fickle Jade.

Gas engineers the world over who have followed the reports which from time to time during the last two or three years have appeared in the "Journal," of the results of trials at various gas-works at home and abroad of so-called self-carburetting processes, must be sorely puzzled to account for the inconsistencies which they present at every turn. Some observers have found, or predicted as certain, gains of upwards of 100 per cent. in the "candles per ton," or somewhat less in the "B.T.U. per ton," as the result of carbonizing coal under the influence of a stream of simple water gas, while others, notably Herren A. Albrecht and Shirk Boyer (*vide* "Journal" for the 28th of June last, p. 956) have found a distinct loss. Now come results of a preliminary series of carefully conducted trials on a full working scale, with inclined retorts, at the Mariendorf Gas-Works in Berlin, of which we are able to give a report in another column to-day, from the pen of Herr E. Körting, on behalf of Mr. E. Drory. These results, it may be remembered, were referred to by Professor Vivian B. Lewes in the course of his lecture at the meeting of the Irish Association, as already reported; and they certainly deserve most careful attention.

It is noteworthy that the above-named distinguished leaders of Continental gas-works practice have not thought it worth while to make tests for illuminating power of the gas produced in their trials. It is the gains in volume and calorific power only that they heed; and a moment's consideration of the present chaotic condition of gas photometry, and of its utter futility, will carry the conviction that they have adopted the reasonable course. When, with one and the same burner, gas appears as of either 14 or 13 candle power, or as of either 12 or 9 candle power, according to the rate at which it happens to be burned, it is obvious that the "candles per ton" gained or lost by self-carburetting will differ immensely according to the convictions of the photometrist as to the mode of using the testing burner. There is further confusion introduced by want of uniformity as to the proper burner to employ—*i.e.*, whether Sugg's "London" argand or the Elster, the Wandsworth, and so forth. Hence it would indeed be surprising if self-carburetting were found to show the same results in regard to the yield of "candles per ton" in English and (say) German gas-works. But in regard to the yield of thermal units, consistency might reasonably be hoped for; yet it is utterly wanting, as those who have followed even recent reports only will have observed. Whether there is an innate fickleness in the self-carburetting process, or whether some of the engineers who have worked it have not grasped the essential conditions of its successful application, remains to be seen. But until the opprobrium of fickleness which it has justly or unjustly earned, is removed by the results of further trials—such as those that are contemplated later at Mariendorf—the more conservative gas engineers will regard it with disfavour.

Coke-Oven-Gas Distribution in England.

THE development in gas distribution which has been made at Royston (Yorks.) cannot be passed by without extending to it a welcome in the leading columns of a paper devoted to the progress and interests of the gas industry. The importance of the project which was inaugurated with a little friendly ceremony, but without any great flourish of trumpets, last Wednesday, cannot be measured by its magnitude, but rather it is regarded from the point of view that it represents another branching off from the beaten track which may—we do not say will, though it seems hardly necessary to hesitate now—issue in much bigger things in the same line. Though the scheme is not large, the new Company, which has been formed for the purpose of distributing for general consumption in Royston coke-oven gas enriched by benzol, starts with a business before them that many old gas companies would even now like to see within their grasp; and this again has only been obtained at such an early stage of the existence of the new concern by the enterprise of its promoters—at the head of whom is found Mr. Henry Ellison, with Mr. Robert Porter, of Elland, as their Consulting Engineer. The scheme is described elsewhere with a fulness which shows our appreciation both of the work of the men who have been responsible for directing the initial stages of the project, and of the importance to districts where coke-ovens exist of the experience that will be gained at Royston. If successful at Royston, the distribution of the same gas may be made successful wherever it is procurable.

Of course, a complete pronouncement upon the scheme cannot yet be made. The relations as sellers and buyers of Company and consumers have yet to settle down; and there are certain things about the gas itself on which some further knowledge is required. These are the times when the cheapening of gas is in progress. The "raw" coke-oven gas is obtained by the new Company at 6d. per 1000 cubic feet; and it will not be long that enriching, capital charges, maintenance, management, working expenses, and so forth, can need the great difference between the 6d. and the 3s. 9d. which is the Company's maximum price to private consumers, and which they are charging at the start. But the Directors are determined to reduce, and reduce as early as they possibly can; and they have every reason to do so, inasmuch as they are tied, by their agreement with the Local Authority, to a sliding-scale of prices and dividend. There is another matter, about which there is a little doubt, and that is the question of calorific power. But judging from the incandescent lighting seen last Wednesday evening, and the time in which a large dinner was cooked, there is not much wrong in this respect. Perhaps there will have to be some little regulation of the air supplies to bunsen burners. But this is a comparatively insignificant matter; and the necessary adjustment can be easily effected. On this and other matters of interest, however, we shall be able to speak authoritatively later, when the experience of the next few months comes to our aid.

Robbing Peter to Pay Paul.

IN the course of an exhaustive inquiry held at Tiverton last week with reference to the proposed electric lighting works, the Local Government Board Inspector suggested that the Corporation were about to embark on a scheme which would injure their own gas undertaking. The answer of the Corporation was that in other towns the installation of the electric light has been found to stimulate the use of gas. A similar statement was made before another Inspector who was holding an inquiry a few days earlier respecting an application by the Plymouth Corporation for a loan for the extension of their electricity undertaking. The Town Clerk of Plymouth told the Inspector that the Corporation and the Gas Company were on friendly terms; the Company recognizing that so long as the concern was on sound lines financially, though in a sense a competitor, the electric light undertaking did them no harm, for it stimulated the demand for light. The same kind of argument has often been used before; and in many quarters it has come to be accepted as a truism that gas-works benefit instead of lose by the introduction of competition in the form of the electric light. It undoubtedly is true that there has been in recent years a remarkable growth in the demand for artificial illumination; and to a very large extent this increase has kept pace with the development of the electric light. But while it is true that the taste for more light has so extended as to find employment for both gas and electricity works, it is not true to say that the establishment of the latter works is responsible for the far greater use of gas. As a matter of fact, gas companies have in many cases felt the effect of the competition of electricity in the lighting branch of their business. Thanks to the wonderful development of the incandescent burner and all its improvements, gas has been able to more than hold its own against its younger competitor in the field of lighting. It must, however, not be forgotten that very much of the increased demand for gas in recent years is due to its extended use for cooking and heating, and to the introduction of a new class of customers through the invention of the prepayment meter. These are things capable of making their way without the stimulus of competition; and in that sense certainly the greater use of gas owes nothing to the electric light. No doubt an improvement of lighting in isolated cases will tend to create a desire for better lighting all round; but this is a kind of thing which any local authority owning gas-works can manage without themselves establishing electric light works or waiting for anyone else to do so. In places like Tiverton, where the population is now stationary if not declining, the advantages of competition may prove somewhat doubtful; and the Inspector's warning that the Corporation, in setting up this opposition, were "robbing Peter to pay Paul," may prove to have been prophetic.

Earl's Court Gas Exhibition—A Hint for Gas Managements.

Last week we called attention to the question of the financial support which it is hoped that all gas undertakings will extend to the forthcoming Earl's Court Exhibition. Without interfering with the aid given in that direction, there is yet another way in which they can help to further the interests of the exhibition, and that is by advertising it among their consumers. The Gaslight and Coke Company are, so far as we have heard, the first to take steps to do this; and their example should be taken as a suggestion, and be acted upon by the managements of all gas undertakings—particularly the London and Suburban ones. What the Gaslight and Coke Company are doing is this: On the face of all the gas accounts which they will be sending out at the close of the current quarter, there is printed this notice—

INTERNATIONAL GAS EXHIBITION.

The Gaslight and Coke Company desire to call the special attention of their consumers to the fact that AN EXHIBITION of all the most Modern and Efficient Appliances for Lighting, Heating, Cooking, and Machinery-Driving by Gas will be held at the EARL'S COURT EXHIBITION GROUNDS from the 19th November to the 17th December next.

Concerts, Lectures, and Cooking Demonstrations will be given daily, and every effort will be made to make the Exhibition both interesting and profitable to every householder and business man. Full particulars will be advertised in due course.

This means that the notice will meet the eyes of no less than 248,637 ordinary consumers (the figures given in the last issue of "Field"); and if steps are taken to make the prepayment consumers acquainted with the fact as well, this will bring the number up to 406,032. If the whole of the consumers—ordinary and slot—in the districts of the three Metropolitan Companies received a similar notice, it would mean its advertisement among the good, solid number of perhaps not far short of 800,000 consumers; and, adding on the customers of the Suburban Companies, we reach a number that may now be but little below a round million, seeing that the total consumers—Metropolitan and Suburban—at the end of last year was about 928,800. This shows what a powerful amount of good gas undertakings can exercise in making the exhibition known among the public. Those, too, who are responsible for the conduct of gas undertakings in the Provinces should also advertise it in a similar manner; so that consumers who have occasion to be in London at that time may not miss the exhibition through want of knowledge as to its existence. Gas committees and directors in the Provinces might make it their business to invite applications to them for admission tickets by those consumers who were going to be in London at the time. This would be an inducement for a visit to Earl's Court. Only the other day, we heard of one gas engineer who

is advising, or is going to do so, his Directors to invite as their guests a few representative gas consumers to join the Board on their visit to London to see the exhibition. Hints of this kind may be very useful elsewhere.

Fire Office Rules as to Gas Lighting.

It will be seen by our "Miscellaneous News" to-day that the Associated Fire Offices have lately issued a set of revised rules to be observed in connection with apparatus for generating, compressing, &c., gas for lighting purposes. By "gas" is meant not only coal gas, but acetylene and oil gas. The rules are so short that they may be committed to memory, and therefore it is sufficient just to call attention to them here. It may be pointed out, however, that the Offices require that every gas-light of more than 175-candle power shall have a metal heat-deflecting shield, at least 10 inches in diameter, fixed above the lamp; and that pipes, whether flexible or not, connecting an incandescent gas-lamp to the gas supply, must be of metal, with metal connections. Incandescent gas-lights employed in textile, flour, and oil mills are not to be fitted with ordinary pilot-lights or bye-passes.

Wages and Hours of Labour Last Year.

According to the annual report prepared by Mr. A. Wilson Fox for the Labour Department of the Board of Trade, the changes in wages last year resulted in a net decrease; but the amount of the fall, measured in weekly loss of wages, was less than in either of the two preceding years, though spread over a larger number of trades. Coal mining, iron and steel, engineering, shipbuilding, and glass were the trades most affected by the fall. In the industries for which it is possible to obtain definite statistics with regard to the number of persons concerned, the report shows that about 897,000 workpeople had their wages changed during the year 1903. Of this number, about 21,000 obtained increases. amounting to rather more than £1500 per week, while 875,000 sustained decreases amounting to more than £39,800 per week The net result of all the changes reported to the Department in 1903 was thus a decrease of £38,300 in weekly wages. This compares with decreases of £72,700 in 1902 and £77,300 in 1901. Taking into account the various dates at which the changes in 1903 came into operation, the net decrease in the year's wages bill due to the alterations recorded in the report may be roughly estimated at £500,000, compared with decreases of £2,300,000 in 1902 and £1,600,000 in 1901. The changes in hours of labour recorded in 1903 were unimportant; but those which took place resulted in a net reduction. The number of workpeople affected was the lowest recorded in any year since these statistics were first collected in 1893. As far as the gas industry is concerned, a few increases in wages occurred; the gas stokers at Alloa getting an advance averaging 2s. 2d. per week.

American Methods of Increasing Gas Output.

Of the various devices resorted to, during the past twenty years, for extending the use of gas for culinary purposes, none has been attended with more success than the attractive exhibition, supplemented by lectures and demonstrations. English gas companies—or rather those who are responsible for their management—have shown themselves to be very resourceful in this respect; but we are not aware that any of them have gone quite so far as the Milwaukee Company, whose methods are described in the article communicated by Mr. P. Eves, of Paterson (N.J.), to the "American Gaslight Journal," which we reproduce elsewhere. Recognizing that their canvassers should possess a thorough knowledge of how to use a gas-range, they have opened a cooking school for the instruction of the staff. The lessons given are comprehensive and thorough; special attention being paid to managing the burners, heating the ovens, and securing the greatest economy in preparing a meal. The lady demonstrator engaged for the purpose was requested to devote more attention to ordinary household cooking than to novel *menus;* and her lessons are followed by a second series, given by another lady. The canvassers are thus equipped with a fund of valuable knowledge, of which the consumers gladly avail themselves. One of the staff who took special interest in the work became an expert cook, and an authority on matters pertaining to cooking by gas.

How the Churches and Press Assist.

But the most novel feature in connection with this movement is the remarkable way in which the churches have been brought into co-operation with the Gas Company in helping it forward. It would sound strange to English ears to hear an announcement of cookery lectures read from the pulpit on Sundays, or to be called to attend them by the aid of the church bell. Yet this, we read, is done in Milwaukee; and we venture to assert that both of these accessories of the service might be less usefully employed. The Church directs her attention primarily to spiritual matters, but not to the entire disregard of those which conduce to the health and well-being of the body; and among the latter it is not too much to claim a place for the proper preparation of food. With the great majority of a congregation, good cookery is of far more importance than casuistry. In the case under notice, we find from 175 to 200 people attending these church demonstrations; and as they naturally talk over the matter with their neighbours, the Company's work comes to be heard of outside the locality. Seeing the popularity of the demonstrations and the friendliness of the churches, the Press, wishing to be "in the movement," have rendered help by means of "advocative paragraphs." All this makes for a wider appreciation of the advantages of gas in the domestic circle, and the consequent pecuniary benefit of those who supply it.

The New Act as to Private Sidings.

Among the batch of Bills which received the Royal Assent on the last day of the session was the Railways (Private Sidings) Bill. The object of this measure, which was referred to in our Editorial columns while it was passing through Parliament, was to replace owners of private sidings in the position they were supposed to occupy before it was decided by the Courts that Railway Companies had the power of refusing all traffic from these sidings. This position of affairs the Mansion House Association on Railway and Canal Traffic, of which Sir W. Tomlinson, M.P., is the acting President, endeavoured to get altered; and, aided by the persistent support of a number of Members of Parliament, they have succeeded in doing so. The Act is a very short one, but it makes it perfectly clear that ordinary traffic facilities must be afforded to owners of private sidings. In the second section of the Act it is set forth that the "reasonable facilities" which every railway company is required to afford under section 2 of the Railway and Canal Traffic Act, 1854, are to include "reasonable facilities for the junction of private sidings or private branch railways with any railway belonging to or worked by any such company, and reasonable facilities for receiving, forwarding, and delivering traffic upon and from those sidings or branch railways."

WATER AFFAIRS.

Justifiable Criticism Resented.

WHEN the shareholders of a Water Company have been accustomed for some years to receive 10 per cent. interest upon their investment, the half-yearly meetings at which they hear the welcome announcement from the Chair that the dividend will be at the accustomed rate are not likely to be very turbulent ones. There would prevail among the proprietors a feeling of calm serenity begotten of entire confidence in the wisdom of the Board, and thorough contentment with the gifts they were in a position to provide. If to these were tacked on something extra—say, in the nature of the payment of income-tax—so much the better. It would be a further proof that the gentlemen composing the Board were the right men in the right places. This appears to have been the position of affairs with the Sutton Water Company, a report of whose recent half-yearly meeting was given in the "JOURNAL" last week. The Directors had at their disposal a sum sufficient to enable them to recommend a dividend at the rate of 10 per cent. per annum, add £500 to reserve, and have a balance of £2012 to carry forward; and they proposed, as has been customary for many years, to pay the dividend free of income-tax. This would have been agreed to without a remark, except of a laudatory character, had not a disturbing element

appeared, in the person of Mr. Alexander Dickson, who ventured to question the Company's power to do what they proposed, in view of the decision in the Ashton-under-Lyne gas case. The Chairman merely replied that the Company had always done it, and should continue to do so as long as they could, notwithstanding the ruling of the Courts. They had not obtained any legal opinion on the matter. Yet it was distinctly laid down in the Ashton case that to pay 10 per cent. and also the income-tax was exceeding the Company's statutory powers; and if at Ashton, why not at Sutton?

Mr. Dickson has been duly "snubbed" in one of the local papers for having the audacity—especially as he was a man who "hails from Deptford"—to make the "unheard-of sug-"gestion" that the Directors were paying the shareholders more than they are legally entitled to. It would appear, therefore, that no one residing outside the select circle of Sutton should venture to question the policy of the Directors of the Water Company. But as the man from Deptford happens to be the Chairman of the Bromley Gas Company, and was for many years Secretary of the Kent Water Company, he may be supposed to know quite as much about the law of water supply as the Sutton Board, and possibly nearly as much as the Solon of the local paper who characterized his suggestion as "unheard-of." It is idle to talk of the improbability of anyone moving the Attorney-General in the matter. The Company are now paying more than their full dividends; and this, according to the decision in the Ashton case, Mr. Dickson contended they are not entitled to do. Besides, the Directors do not pay the income-tax on the preference capital dividends. Nor is it to the point to say that the payment of income-tax in this case must be considered in the light of an adjustment of deficient back-dividends, which the Company are, of course, entitled to make up. If the Directors so regard it, let it be specified in the books and in the reports. This would be a perfectly straightforward proceeding, and, moreover, it would disarm criticism, whether it came from Deptford or any other quarter. There were certain other matters, connected with the filling of a vacant auditorship, upon which Mr. Dickson put what we consider were very pertinent questions in the interests of the shareholders; but this self-satisfied body regarded them in quite the opposite light, and they declined to support him. There must be no criticism at Sutton—especially from outside.

Water Supply Difficulties in Paris.

In a paragraph which appeared in the last number of the "Journal," our readers will have seen that Paris is once more in trouble over its water supply. The existing supply is inadequate, and not above suspicion, as evidenced by the fact that in the week ending the 20th inst. the Municipality had to issue notices warning all the inhabitants to boil the water intended to be used for drinking purposes. As on several previous occasions, the summer this year has absolutely falsified the predictions of the Engineers of the Municipal water service, who declared that the hot weather could not last more than ten consecutive days. This dictum was possibly laid down after a most elaborate display of mathematics, including the calculus. But Nature was too much for the technicians, and multiplied their total by three in July only. On recovering from the shock to their feelings caused by this outrage, they set about curtailing the supply; and it was eventually shut off for six hours out of the twenty-four. This effected a saving of about 11 million gallons a day. As the shutting off lasted from midnight till 6 a.m., a question arose as to how this quantity of water could be saved on domestic consumptions; and the matter was taken up by M. Vallin, a member of the Hygienic Council. He found that as the daily consumption was about 83 million gallons, the average for six hours would be nearly 21 millions, out of which he thought it should not be difficult to save about half. The wonder was where this saved water generally went to; and as it means something like 4000 million gallons annually, the matter is being investigated. And quite rightly, for the reservoir capacity for filtered spring and river water is only about 135 million gallons per day. All waste checked husbands the store, which is by no means adequate. Indeed, the word applies to the entire system. This is recognized by the authorities, as is proved by the deputation from the Municipality now visiting Germany to inspect the water-works of some of her chief cities.

A GAS-WORKS WITHOUT A RETORT-HOUSE.

Distribution of Coke-Oven Gas at Royston (Yorks.).

Standing alone, there would appear to be something enigmatical about the headline to this article; but the sub-title at once sets any question completely at rest, and explains—though inadequately—what is meant. We have heard before of schemes for the utilization of coke-oven gas for lighting from the extensive Everett plant in America, and also of the proposal for the disposal of the gas product of a large battery of coke-ovens in Milwaukee. Information, too, long since reached us of the utilization of the gas from the coke-ovens at the Brymbo steel-works near Wrexham, for the lighting of the works, offices, and residential premises connected with the works. Similarly, the same thing is done at a few isolated places in other parts of the country. But, speaking generally, coke-oven gas has been, in this country regarded as a waste product, and treated almost ruthlessly as such by being merely employed for assisting in heating the ovens and the boilers about these huge establishments in which are planted as it were the root of the industrial greatness of Great Britain.

Now for the first time in this country gas from coke-ovens, treated and enriched as will be described, is being distributed for general use throughout a district—for lighting, cooking, and heating; and the district is that which comprises the township of Royston in Yorkshire. It is well to put the county as there is another Royston in the country; and there should be no mistake as to which Royston has the honour of being the first to have distributed through its streets a hitherto waste product in a condition for utilization in the manner mentioned. The township has, up to the present, been outside the pale of the gas industry, and consequently has been little heard of among those identified with that industry. To those accustomed to town life, Royston wears a semi-rural aspect. There are no palatial residences here. The whole of the houses, or rather the bulk of them, are of the cottage type—built of red brick such as is customarily found in the villages of Yorkshire; and the inhabitants are largely colliers, or are in some way identified with mining. At one end of the village—it should really now be called a town—are seen the huge hills of waste which have been thrown up by the operations of the New Monckton Main Collieries, which to a large extent form the hub around which Royston has its existence. From those collieries have risen the new development, which will bring upon Royston the eyes of the gas industry and of many scientific men for some time to come. In the history of gas, too, though it may not be apparent to the inhabitants, the little Yorkshire township will become famed on account of this its new adoption, which, as already hinted, is unique for this country. It should be explained that Royston is, as a matter of fact, in the district of supply of the Barnsley Gas Company—having been incorporated by the Company's Act of 1867. But for some reason or other, which it is not our business to inquire into, the Company have never taken advantage of their powers. Whatever the reason, we are not sorry that it has fallen so, seeing that their failure to supply the place, or inability to successfully do so from the commercial point of view, has brought about the successful accomplishment of the scheme with which we are about to interest our readers.

The New Company and its Originators.

For the purpose of distributing the gas, a Company has been formed under the title of the Royston (Yorks.) Gas Company, Limited. It owes its birth, we think it may be said, to that energetic gentleman in the tar-distilling world, Mr. Henry Ellison, of Cleckheaton. He takes the position of Chairman of the new Company; and he has as colleagues on the Board Mr. C. C. Ellison, the Manager of the New Monckton Main Collieries, and Mr. Joseph Wood. The Company have a capital of £10,000; but up to the present the whole has not been issued. The expenditure has been more than it otherwise would have been from a fact connected with distribution which adds a second point of interest to this scheme, and again sets the Company in a unique position among the gas undertakings of the country. But more on this point presently. The first act of the promoters of the concern was—it goes without saying where a man of such business acumen as Mr. Henry Ellison is concerned—to appoint a Consulting Engineer, to both guard their steps and to carry the scheme to completion; and their choice fell upon Mr. Robert Porter, of Elland, whose work was referred to, at the formal starting of the supply last Wednesday, in terms of unqualified approval and confidence. Simultaneously, the Local Authority were approached; and, without much ado or negotiation, they welcomed the venture which was to turn their darkness into light, and entered into an agreement with the promoters. And there is no doubt that, whatever may happen in the future, the Local Authority intend to stand by the Company who have come to their aid, without committing the district to any financial responsibility. Not only so, but two other adjoining Authorities, not wishing to be left behind by their neighbours of Royston in the march of progress, have approached the new Company, asking them to take the mains into their districts. From what can be seen under present circumstances, prosperity, and increasing

prosperity, is already assured to the Company; and very soon it is clear some of the unissued capital will have to be raised. We say this, notwithstanding the knowledge that, working as they are on new lines, the Company will have to feel their way as it were, and go step by step. It must be so with a novel supply such as this; and there are several things upon which experience has to be gained. But these, so far as the present enables one to penetrate them, exhibit no insuperable difficulties.

From Coke-Oven to Holder.

The first thing that strikes one on investigating what the Company are doing is the simplicity of the works required for utilizing the coke-oven gas. The coke-ovens at the Monckton Main Collieries are of the Simon-Carvès type; and the Gas Company have entered into a contract to purchase and be supplied with all the gas they may require from the ovens. The gas is taken off by central pipes from the top of the present battery of 35 ovens, is collected in a large main, and from this is passed, through arch-pipes, into a hydraulic main in the ordinary way. There is another battery of 36 ovens now in course of construction; so that the Gas Company are not likely to have any trouble, so far as their source of supply is concerned. Even the existing battery of ovens is capable of dealing with 160 tons of coal a day. It is reckoned that the production of gas is close upon 10,000 cubic feet to the ton; and therefore it will be seen—this being only a single instance—what a tremendous waste of gas there must be going on in the country daily which could be better utilized than by heating the side walls of coke-ovens and burning under boilers. However, after leaving the hydraulic mains—the exhausters used by the way are of Messrs. Bryan Donkin and Clench's make—the gas is subjected to water cooling and treatment in scrubbers and washers by the Colliery Company, and the ammonia is extracted; the average yield of ammonia being 25 lbs. per ton of coal. The Colliery Company then pass into the Gas Company's plant the gas they require; and the surplus is sent through creosote oil scrubbers and washers—finally passing away for the heating of the side walls of the ovens, and the four boilers as previously explained. The gas sold to the Company is purified before being registered; and the gas so registered is to be charged out to the Company at the rate of 6d. per 1000 cubic feet, if they take over 10 million cubic feet per annum. After being registered, it is passed through a benzol enricher, and away to the gasholder ready for consumption.

It will be observed from this that the new Gas Company are not troubled with a large amount of plant. It begins with two purifiers constructed, on the Green system, by Messrs. Thomas Tattersall and Sons, of Elland. The boxes are 12 feet square by 6 feet deep; and oxide is the purifying material used. The purifiers are capable of dealing with 100,000 cubic feet of gas per day. Up to this point, the gas has been conveyed, by 4-inch pipes—the distance between the ovens and the purifiers being only some 250 feet—at a pressure of about 10 inches. In a newly constructed house adjoining the purifiers are found, first, one of Marsh's 8-inch "Rotary" meters, which has been accepted by the two Companies as the arbiter of the amount of gas delivered and received, a Simon-Carvès benzol enricher, and one of Alexander Wright and Co.'s jet photometers. The carburetting apparatus is a simple arrangement, and very effective; and so far as observation has enabled Mr. Porter and other of the Company's representatives to judge, the enrichment is permanent. Outside the enriching-house, there is an underground tank for the storage of the benzol; its capacity being about 20 tons. From here a hand pump raises the benzol as required to an overhead service tank inside the house, from which it is delivered to the carburettor, which is capable of dealing with 300,000 to 400,000 cubic feet of gas a day. The benzol used (90's) is the production of the Colliery Company.

Now we come to an interesting point, which permits a break in the description of the Gas Company's plant. On one side of the enriching-house is seen a flame, from a Bray flat-flame burner, of the purified coke-oven gas before enrichment. The flame is comparatively small, with a large proportion of blue in it, and a luminous fringe along the top of perhaps not more than $\frac{1}{2}$ inch deep. The illuminating power of this coke-oven gas varies between 6 and 12 candles; the average being about 8 candles. On the other side of the house, is a flame of the benzolized gas; and it is a flame about as perfect as a luminous flat-flame can be. The gas is enriched up to about 16 candles, or rather that is what the Company are arranging to work to. Just at the time of the inspection, the indication of the jet photometer was that the gas was nearer 20 candles than 16. But as we said before, the Company have to feel their way; and as soon as they get to work in a regular fashion, then experimental investigation, from which regulation on all points will ensue, is to be taken up. Then we shall hope to get (Mr. Porter promises it) some interesting data, as to illuminating powers, calorific value, quantity of benzol used, and so forth. The calorific value is an important question; and inquiry is going to be specially directed to this in order that the burners of the gas fires and cookers may be, if necessary, specially adjusted.

Near by the house containing the enriching plant is a small gasholder of 5000 cubic feet capacity. This holder was built by the New Monckton Company in connection with a little gas plant that they had in operation in days gone by for the lighting of the premises and the officials' and workmen's dwellings adjoining. This holder (to be ultimately used as a reserve) is at present being employed for the supply of the district, until—two or three weeks hence—a Gadd and Mason holder, which Messrs. Robert Dempster and Sons, of Elland, are constructing, is completed. This holder is situated on land facing the Royston Station of the Midland Railway Company, and is perhaps some 800 or 900 feet from the plant which has just been described. The Contractors have only had this holder in hand some two months; and yet it will be completed in the time stated above. Of course, this has meant working practically day and night; but the men have gone about it with right good will, and are making an excellent job of it. The rivetting has been done by hydraulic machinery; the firm specially erecting for the purpose on the site the necessary hydraulic pump and accumulator. The tank is constructed of steel above ground, and is 63 ft. 9 in. diameter and 20 ft. 6 in. deep. At present, the holder is being built with a single lift, but it is prepared for telescoping. The diameter of the single lift is 60 ft., and the depth 20 ft.; the capacity being about 60,000 cubic feet. The reason a holder on the spiral system was selected was simply because Mr. Porter considers that, for a mining district, it is the best system, as, if there is any settlement, the working of the holder is not interfered with, so long as the settlement is not sufficient to cause the sides to go out of plumb to such an extent as to catch the tank sides. To this holder the gas will be delivered, from the carburetting plant, through a 6-inch pipe, at 10 inches pressure.

For Emergencies.

Before taking up the question of distribution, there is one other point to be noted; and it is this: At the colliery works there is a little retort-house, which, as already stated, was, in the olden days, used for making the gas required in the houses of the officials and employees. The settings were composed of eight small retorts, and were probably capable of making about 4000 cubic feet of gas a day. The Directors of the Gas Company, on Mr. Porter's suggestion, are now considering the question of putting into this old house two beds of six retorts on the regenerative system, as a stand-by for emergency—for instance, in the event of the coke-ovens being let down for a day or two in the depth of winter.

Distribution and Price—Another Unique Feature.

This brings us to the distribution system. From the Gadd and Mason holder, the gas will be delivered throughout the district, after passing through a Braddock 6-inch governor. At present, two 6-inch trunk mains have been laid through the district—one having been put down really with a view to an extension to another village. It will be remembered that the Authorities of two adjoining areas have been to the Company with the view of also securing a supply. If terms are arranged with these two Authorities, it is calculated that the present estimated consumption, in Royston alone, of about 15 million cubic feet per annum will be increased to something in the neighbourhood of 35 millions; so that the Company have a promising outlook.

But here there is another novelty in connection with the new Company. Coke-oven gas distribution is far and away the foremost, but another matter about which we have now to write makes a good second as a unique feature in gas supply, and shows the robust business qualities that have dominated the inception and execution of the scheme. Nothing has been allowed to stand in the way of success. This is seen in the agreement with the Local Authority, and in the step now to be described. It was all very well to have an agreement with the Local Authority, to have an abundance of coke-oven gas at command, and to get trunk mains through the streets; but all this was no good without the customers. Landlords were approached, and so were the householders. The landlords had an objection to their houses being knocked about by the Company without being put into proper repair; and the householders—hard-headed Yorkshiremen—did not object to using the gas, but "nowt" was to be got out of them for the fitting up of the houses. Directors and Mr. Porter laid their heads together, and away went something like £5000 in putting services and fittings into the whole of the houses of Royston—or rather the fittings are going into the houses as quickly as the labour of a dozen pairs of honest hands can put them there. The inhabitants are therefore in this position: They can be consumers if they like—the gas is, or will be soon, on tap in all their houses. This means from 900 to 1000 houses fitted up. New houses will be dealt with as they are being erected; and this will in future lighten the expense of fitting up. So far as we know, there is no other Gas Company in a like position in this country. Gas cookers, fires, and all other appliances required will be fitted free, at a low rental. The Local Authority have given the Company an order for eighty lamps for street lighting, on the incandescent system; and, by the way, the benzolized coke-oven gas gives admirable results with the incandescent burner. It is expected that by Oct. 1 the whole of the fitting-up scheme will have been completed.

This brings us to the question of price. We have mentioned the figure at which the Gas Company will obtain the "raw" gas from the Monckton Main Colliery Company; and now there is the question of charge to the consumers. Before the Company can gauge what will be something like their normal condition, they have to obtain experience as to what the demand is likely to be, and what will be their own ultimate expenditure. Everything is different here from gas supply conducted in the usual manner;

and there is for the moment little to guide. Under their agreement with the Local Authority, the maximum prices (and these are ruling at the start) are to be 3s. 9d. per 1000 cubic feet for private consumers, 4s. 2d. for slot consumers, and 3s. 6d. for public lighting. At these prices, the Company are allowed to pay a dividend of 7 per cent. For every 1d. reduction, there is to be a 1 per cent. advance in the dividend. Therefore everything is being properly done by rule; and for both consumers and Company, the prospect is excellent, looked at financially. Everything points to an early reduction; but the consumers must grant the Company time to see just where they are. The Company and the consumers both have this on their side—that, there being no gas-generating plant, manufacturing repairs and maintenance will be low; and the same may be said of the expenditure on wages. But the Company, on the other hand, have incurred an unusual expenditure at the other end of their business in laying services and fitting up the houses free. And all this must be taken into account. The application of the principle of the sliding-scale of price and dividend will, the consumers may rest assured, bring down the price with a run when the Company feel their feet, and it is the inhabitants of Royston who must help the Company to do so as quickly as possible. The latter have already a show-room in which they are exhibiting an excellent assortment of gas appliances, in order that the consumers may have their choice, and may, if they feel so disposed, go in for additional and improved fittings beyond the regulation patterns supplied by the Company under their plan of operation.

It should be mentioned before closing this general account of the scheme of the pioneer Coke-Oven Gas Company in this country that Mr. J. L. Barraclough, who has served for ten years at Elland under the Consulting Engineer (Mr. Porter), has been appointed Manager of the new Company; and Mr. Paley is the Secretary.

To the Chairman and Directors, to the Consulting Engineer, and to all concerned, we offer our hearty congratulations, both on the success which has so far attended their efforts, and also upon their being identified with this pioneer enterprise in connection with the general distribution of coke-oven gas.

The Opening Ceremony and Banquet.

The formal inauguration of the new undertaking was an event for Royston last Wednesday. The first stage in the celebration was the opening of a valve on the trunk main near to the Midland Railway Station. At four o'clock in the afternoon there was a crowd of goodly proportions on the spot; and prominent in the inner circle were Mrs. C. C. Ellison (who had kindly undertaken the duty of turning the gas into the mains), the Chairman (Mr. Henry Ellison) and Directors of the Company, the Consulting Engineer, representatives of the Local Authority, members of the contracting firms, and several gas engineers from neighbouring towns.

The CHAIRMAN, in his opening remarks, supplemented the information given in the foregoing special article. He stated, as showing the rapidity with which events had moved in connection with this matter, that it was only ten months since that he came to Royston. After that he saw the Local Authority, and asked them whether they would allow him to bring gas to the township. No other Company had brought gas to the place; and he would risk the rights of any other Company. The Local Authority had given him a concession for 25 years. But this had not been done without a lot of bargaining; and he could assure the ratepayers that their interests had been well looked after. However, by the end of February, they had come to terms; and the Company commenced operations in connection with the laying down of the plant in March. He should like the engineers present to take into consideration that in four months they had laid five miles of main pipes, bought from Messrs. James & Ronald Ritchie, Limited. About 900 meters had also been connected; and these were supplied by Messrs. Alder and Mackay. They had also put in about 25,000 feet of services supplied by Messrs. Nicholson and Co., of Halifax. He likewise mentioned the plant described in the foregoing article, and the contractors' names. Then they had done something that had never been, so far as he knew, done by a Gas Company before; and this was that they had undertaken to put fittings into the whole of the houses, and into every room where the tenants wanted them, including a gas-griller. This was all being done free. The work of putting in the fittings had been entrusted to Messrs. Ward and Fowles, of Halifax; and in something less than four months, they had fixed no less than 8000 lights. He paid a tribute to the energy throughout of their Consulting Engineer; and proceeding, he claimed credit for the Company being the first in the country to take gas into all the houses in a district of supply to the point of consumption, and also for being the first to bring about the general distribution of coke-oven gas. In concluding his remarks, he invited Mrs. C. C. Ellison to turn the gas into the distribution system.

Mrs. ELLISON having gracefully acceded to the request,

Mr. JOSEPH WOOD, on behalf of the Company, moved a vote of thanks to Mrs. Ellison.

Mr. J. W. BROADHEAD (Messrs. Robert Dempster and Sons, Limited), in seconding, said he thought Mrs. Ellison ought to feel proud in knowing that she was the first lady to turn coke-oven gas into the distributing-mains of a gas supply district. He also observed that Royston was much indebted to Mr. Henry Ellison for having brought to them a supply of gas.

The motion was carried by hearty applause.

Mrs. ELLISON, in responding, said she felt very much honoured in having been asked to perform this ceremony. She hoped the Company would be successful, and that the gas would be much appreciated by the people of Royston. Artificial light had been much needed there; and so she wished the Company "Good luck."

Cheers were given for Mrs. Ellison; and this ended the pleasing little function.

The extensive works of the New Monckton Main Colliery Company were then visited, chiefly for the purpose of inspecting the Simon-Carvès coke-ovens from which the gas is produced, and the purifying, carburetting, and other plant.

Later on, the occasion was celebrated by a banquet at the Monckton Club. There were about 55 guests, including members of the Gas Company, representatives of the Local Authorities, Gas Engineers, and others. Mr. Henry Ellison presided. One feature of the dinner was that it was cooked by the benzolized coke-oven gas, and was the first dinner so cooked in Royston. This being so, as a matter of interest, the index of the meter was registered before and after the completion of the cooking. The dinner was a large one to cook, as is seen by the *menu*—"Turtle. Purée of Tomato. Salmon and Cucumber. Poulet Sauté aux Champignon. Roast Saddle of Mutton. Asparagus. Roast Grouse and Chips. Cabinet Pudding. Compôte of Fruit. Cheese and Salad. Dessert. Coffee." Also be it remembered 55 gentlemen sat down to dinner; and yet, it was afterwards seen, the actual consumption of gas for cooking was only 700 cubic feet, with 300 cubic feet more for plate warming and hot water. Toasts were proposed and duly honoured after the dinner. Congratulations, too, were tendered to the Gas Company by gentlemen representing the local governing authority on the successful starting of their new enterprise; and due acknowledgment was made by Mr. C. C. Ellison (who had succeeded Mr. Henry Ellison in the chair) of the cordial co-operation of the Local Authority—one of whose members said the Council would stand by the Company who had brought them light, and he hoped the consumers and inhabitants would also do so. We cannot report the speeches; but reference must be made to the happily phrased speech of Mr. G. H. Niven, of Cleckheaton, in responding to the toast of the "Gas Industry." He remarked that he was pleased to be surrounded by gentlemen of his own profession—a profession of which he was personally proud. He was very pleased to know that the village of Royston was being lighted on what was practically a new principle. During the long time he had been connected with gas, he had seen many improvements; and the venture that had been floated that day was, he believed, a step in the right direction. Mr. Ellison, with his knowledge of collieries and colliery work, and the value of coals, would be with him when he said that the wealth of our country was in the coal-fields, and, this being so he (Mr. Niven) thought it behoved every man who was loyal to his country to see that its wealth was not wasted. A large amount of the gas which had been produced by the Monckton Main Colliery Company had been wasted; but now, through the energy of the gentlemen who had set about supplying the town with gas, the hitherto wasted raw material had been taken hold of and, by certain means devised by their Consulting Engineer (Mr. Robert Porter), of whose knowledge of gas affairs they of the gas profession were very proud, the new Company were able to supply the town with very rich gas indeed. In the name of the gas industry, he wished the Company an abundant success. Amid speeches such as this, expressive of all good will and wishes, the Company last Wednesday embarked upon its career, which will be watched with considerable interest throughout the whole industry.

Heating by Coke.—We have received from the Secretary of the Belgian Association of Gas Managers (M. Vansteede) Part I. of the "Transactions" for the year 1903-4. It consists entirely of a communication by M. Boscheron, the Chief Engineer of the Liége Gas Company, and a Past-President of the Society, on the subject of the use of gas coke for heating purposes. The author describes the characteristics of the various stoves employed for this purpose, which are illustrated on seventeen large plates. He maintains that economy, cleanliness, and improved hygienic conditions may be ensured by the use of coke; and his paper will be of value to those who are desirous of becoming acquainted with the different kinds of stoves for utilizing this material which are now available.

Attracting Attention to Show-Room Windows.—The fitting up of a show-room and window in which to exhibit various forms of gas cooking and heating apparatus is a comparatively simple matter; but—and this, of course, refers more especially to business thoroughfares—it may not always be so easy to induce large numbers of people to stop and look at what is on view. This is a difficulty that has presented itself to Messrs. John Wright and Eagle Range, Limited, in connection with their show-rooms at Nos. 19-21, Queen Victoria Street; and consequently an effort, the nature of which has been explained to us by Mr. G. F. Glenny, is being made to overcome it. A frame fitted with a rolling blind, and having on one side of it a "Eureka" cooker and on the other a gas-heated steam radiator, has been placed in the centre of the window. The wording on the blind first calls attention to the cooker; and it is then wound, and instructions appear as to the removal of the burners and fittings for the purpose of cleaning and renewal, which operation a boy in the costume of a *chef* proceeds to carry out. Next follows, in the same way, a demonstration of toast making; and then the method of filling with water and lighting the gas-heated steam radiator (which works without flue, furnace, or pipes, and is claimed to be economical and very powerful) is shown. Over the radiator is fitted a thermometer several feet in length, which gives an idea of the heating properties of the apparatus. It is hoped that this method of demonstrating the advantages of the appliances on view will succeed in "catching the eye" of passers by; and should any provincial gas companies, or local authorities owning gas-works, who possess show-room windows, feel inclined to try something of the same kind, no doubt Messrs. Wright will be glad to give them every information on the subject.

THE PARLIAMENTARY EXPENSES OF THE LONDON COUNTY COUNCIL.

From the point of view of the ratepayer, it is a matter for regret that the London County Council, in their issue of "London Statistics," do not bring their parliamentary expenditure a year closer to date. There assuredly ought to be no difficulty about this. The volume is headed 1903-4; and it has only been issued within the past few weeks. Nevertheless, when we turn to the tables referring to the expenditure incurred by the Council in parliamentary proceedings, it is found that the statisticians of Spring Gardens have not succeeded in bringing the accounts nearer than the close of 1902. Perhaps, from the Council's own point of observation, it is a good thing to keep the figures from inquisitive eyes as long as possible, seeing that the huge costs of their parliamentary warfare yield so little that is beneficial to the Metropolis. The accounts in the present volume cover the period from 1889 to 1902; but there is a ghastly array of measures promoted by the Council, which have run them into a waste of thousands upon thousands of pounds of the ratepayers' money, against which various measures stand the simple words—confessing failure—"not passed," or "not proceeded with." Against heavy expenditures for opposition, too, there is found more that has been abortive than fruitful in usefulness so far as the ratepayers are concerned.

In the period named, 1889-1902, the County Council spent the enormous sum of £185,332 13s. 10d. in promoting Bills, and £78,503 8s. 5d. in oppositions—making a grand total of £263,836. The ratepayers should look very closely into this to see what they have obtained for their money. Of the annual amounts spent on promotions, the year 1902 ranks fifth in order of largeness—the outlay for the session being £14,599; and it may be taken that nearly one-third of this, as will be shown presently, was thrown away. The growing penchant of the Council for trivial hostility and interference with private enterprise is forcibly expressed in the £13,354 spent in the year on oppositions. This is the largest amount they have sunk in this way since 1889; the nearest approach to it being 1896, when the disbursements for the purpose only totalled to £7296. Therefore 1902 topped this by more than £6000. The total parliamentary expenditure for 1902, it is thus seen, was £27,953; and only two years—1899 and 1900—have exceeded it.

When we turn to the classification of the expenditure between 1889 and 1902, it is discovered that—perhaps conveniently for the Council, but inconveniently for us—the expenses incurred in connection with electric lighting, gas, hydraulic power, and telephones, have been lumped under one heading. The reason for this is not apparent. However, the total cost of the promotions in these particular directions came to £4018; and the oppositions to £10,392. But under the head of water supply, the expenditure is enough to "stagger humanity"—the promotions between the years mentioned having cost the astounding sum of £63,870, and oppositions £24,819—together only little more than £11,000 short of £100,000.

The woeful waste of money by the Council on doubtful projects and parliamentary warfare, including the persecution of private enterprise, has been criticized in the "Journal" on previous occasions; and the heaviness of the expenditure in the years preceding the last to which the statistics are now made up has been brought to light. What was then said stands. And really there appears to be little use in labouring it; for no matter what is said in the public Press, the game goes on with not only unabated vigour, but with increased recklessness whenever there is the opportunity. In the session of 1902 alone, it is seen that on the promotion of their Electric Supply Bill, which was rejected, the Council spent £1221; and on the Water Purchase Bill, which also failed to meet with acceptance, £2640 was thrown away. Besides this, in connection with Water Bills, the Water Committee incurred an outlay of £438. Of the total sum spent in opposing Bills in 1902—viz., £13,354—no less than £1887 was spent in fighting Water Bills, and £1032 in opposing the Bills of the South Metropolitan and Commercial Gas Companies. The costs chargeable to the opposition to the measure of the latter Company amounted to £594; and all the Council realized was the withdrawal of the clauses relating to the testing of gas. This is a matter that has to be fought all over again, now that the report of the Board of Trade Committee has been issued. For the £438 spent on the South Metropolitan Bill, the Council obtained the insertion of some doubtfully useful clauses as to the widening of certain streets and the application of the Building Acts.

By no stretch of the imagination can any sane person justify the abominable waste of the County Council in the incessant fighting for which they are responsible at Westminster. We do not allege that the whole of the money is thrown away; but we do maintain that a large proportion of it is the price of senseless action, blundering, oppression, and hate of all enterprise in the public service (so long as it does not affect the members) which does not bear the seal of municipalism. Yet the ratepayers sit quiescent; the reason being perhaps that there are few among them who have knowledge of the facts to be found by searching the pages of "London Statistics."

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 625.)

The Stock Exchange has had another dull, heavy week; but happily the worst of it was over by the time the week was halfway through, so that the close offered a more cheerful prospect. Of minor adverse influences, which especially depressed the gilt-edged division, were the cheap issue of a batch of Treasury Bills and the sharp drop in Water Board stock. But the chief and most alarming factor was the strain upon our relations with Russia over contraband seizures. This brought prices down freely; and railways, already weak, receded in sympathy. Then succeeded a tendency to recover; and this, aided by Mr. Balfour's utterance to the London Chamber of Commerce, effectually put a better complexion on things generally. In the Money Market, the condition was easy; the supply being abundant all through. But the demand is likely to be tighter this week. Business in discount was steady at unchanged rates. In the Gas Market, there was quite a revival of activity, to an extent that is most unusual in August; but naturally the lion's share of the business fell to the Metropolitan undertakings. Prices were scarcely as good as in the preceding week, and there were a few small retrogressions in quotation. But these were in all probability chiefly due to the influence of the general flatness that was affecting even the highest class securities, and not to special weakness. The accounts of various Gas Companies issued, and the proceedings at the general meetings held last week, corroborate the evidence that the gas industry is really in a healthy condition. In Gaslight and Coke issues, the ordinary was very active at steady figures. The price touched 92½ once; but it was mostly above 93, and 93¾ was marked several times. The secured issues were moderately active and unchanged. South Metropolitan was very animated and firm. One bargain was marked at 124; but this was immediately followed by 125¾, and the subsequent dealings were thereabouts. A few deals in Commercials were at about middle figures. Of the Suburban and Provincial group, hardly anything was touched except West Ham. In the Continental Companies, further weakness was apparent in Union, both issues of which had a fall, and Imperial receded a point. There were no changes in the remoter undertakings.

The movements last week were: On Monday, Continental Union fell 2. On Tuesday, Gaslight Ordinary and Imperial fell 1 each. On Thursday, Union fell 1 more, and ditto preference 5.

We now cease to quote the Water Companies, the stocks of which are on the point of conversion into Metropolitan Water Board Stock, and which as undertakings no longer exist. At the same time, we have amplified and extended our list of gas undertakings so that it includes not only the entire number of those quoted in the London Stock Exchange Daily Official List, but also the leading Provincial Companies which are quoted in the Provincial Exchanges but not in London. Our list thus becomes the most complete weekly record of prices and dealings in gas securities which is published.

ELECTRIC LIGHTING MEMORANDA.

Electricians and the South Suburban Gas Company's Circular—An Ex-Electricity Manager as an Editor—Cultivating the Use of Electricity for Power Purposes.

The electricians in the district of the South Suburban Gas Company are in high glee over the circular the Directors lately issued to the gas consumers. It is time the electricians there had something to be joyful over, for they have had hard luck in the neighbourhood of the Crystal Palace right away from the time they ventured to enter into competition with the Gas Company. In the circular—in its confessions and proposals—the electricity suppliers find their opportunity. The gas hitherto noxious, they are telling the consumers, is now going to be even more so. But the electricians do not protest against this; as it really matters little, seeing that the consumers have at their very doors the convenient but expensive electric light waiting to gain entrance. Of course, it does not pay the electricians to be candid, and tell the inhabitants of the district that what the South Suburban Gas Company are proposing to do, is precisely what all but a small percentage of gas-supplying local authorities and companies are doing the country through. In their extremity, this would be too much to expect from the electricans who have been running the old profitless Crystal Palace District Supply Company, which they have been glad enough to append to the more fortunate Blackheath and Greenwich Company, under the new title of the South Metropolitan Electric Light and Power Company. We are afraid, however, the glee of these people is going to be short-lived, for gas consumers are not going to be persuaded by mere clap-trap into giving up an even cheaper source of light and heat than they have hitherto had until they have given it a fair trial. For this reason, and because of their confidence in the result, the Gas Company can offord to sit and watch, with amusement, and without fear or trembling, the delight of the electricians and their little tactics. This is another point that should weigh with the

Local Authorities, in connection with the circular to the gas consumers, that the Gas Company are not only willing to leave their future, under the new conditions, in the hands of the consumers, but they are quite prepared, under those conditions, to meet the fiercest competition the electricians can bring upon them.

Among the humorous incidents which have arisen from the Gas Company's circular, a prominent place may be given to the publication of an editorial on the subject in "Electric Light and Power." This has been reprinted in one of the local papers, and is described by the Editor of the latter as a "trenchant article," which shows his extremely bad judgment. The Editor of "Electric Light and Power" organized and originally managed the weakling that has gone to nest with the Blackheath and Greenwich Electric Supply Company; and therefore it is very good of him to try to do something for the welfare of the new combination, now that he is relieved of the burden and responsibility of his offspring. The gas consumers, however, are not likely to be pleased with the tactless way in which he has done it. Having mentioned the issue of the circular, the late Electricity Manager (who did not enjoy an abundant success in that capacity in the district of the South Suburban Gas Company) now writes as Editor: "Every householder is familiar with the noxious properties of gas, and *no one* in *their* senses would continue its use where electricity is obtainable upon reasonable terms." If the Editor of "Electric Light and Power" cannot write better grammar than this, he will not be a particular success in his new capacity. "No one" in "their" senses! That is beautiful; and so is the insinuation contained in the whole sentence. If the "Editor" is right that "no one in their senses would continue the use of gas where electricity is obtainable upon reasonable terms," then it is a confession either that the quondam Manager of the Crystal Palace Electricity Supply Company was unable to supply on reasonable terms, or that the district of that Company contains a demented population. The former, of course, is the case; but, as gas is the main source of artificial light in the district, it is perhaps only natural that a disappointed Electricity Manager should consider that the inhabitants are not altogether "in their senses." However, it may be some satisfaction to the latter to learn that there is now to be "a considerable improvement in the cost of their electric light," and that they are henceforth to "be relieved of the necessity for continuing the use of the proposed 'cheap and nasty,' less pure, and duller illuminant." The price will indeed have to come down very considerably before the Electric Company will be able to prove to the gas consumers that, by electricity, they can get a cheaper light than by the incandescent gas-burner. The so-called editorial from "Electric Light and Power" is nothing but an advertisement of questionable type for the Electricity Company now supplying in the district of the South Suburban Gas Company; and the Editor of the local paper who regarded the writing as "trenchant" may take it from us that he has lost the price of more than a half-column advertisement. The Gas Company will no doubt be quite content to accept the opinion of the Editor of the local that "the controversy seems to have resolved itself into a duel between the two contending forms of lighting;" and all they ask for is a fair field and no favour in the duel. Under such conditions, they are quite prepared to abide the result.

Those responsible for the management of gas undertakings should note that up and down the country electricity supply undertakings are looking very closely into the question of the finest prices at which they can supply electricity for power purposes. Reports of the revision of rates are constantly being brought to notice. A good example is one which comes from Sheffield, but which will not take effect until the end of December next. In this instance, for all power used in motors driving hoists, cranes, passenger lifts, and similar machinery, the price is to be 2d. per unit; and for other motors 1½d. Consumers who can satisfy the General Manager as to the continuous running of their motors throughout the whole of the working hours of each day, and whose consumption does not exceed 5000 units per annum, are to be charged only 1¼d. per unit, and those exceeding the 5000 units, 1d. per unit. From this price of 1d., discounts are to be allowed, varying between 5 per cent. for a consumption of 10,000 units per annum and 40 per cent. for 750,000 units. It will be remarked that here the Department have provided for all possible consumptions. This activity in connection with the allowing of rebates on electricity used for power purposes must be met by gas suppliers who have not already moved in the matter. It is, as only recently we admitted, difficult to argue either for or against the absolute fairness of any particular rate of consumers' discount; but the day is past, with competition going on sternly for power purposes, to argue in favour of a flat rate for gas all round. The case for developing the supply of gas for power purposes through the aid of discounts, and its beneficial effect upon all classes of consumers, was well put both by Mr. W. G. Bradshaw, the Chairman of the Commercial Gas Company, and by Mr. Charles Hussey, the Chairman of the Croydon Gas Company, in their addresses to the shareholders, as reported last week. We commend their remarks on the point to the notice of all concerned in gas management.

Mr. Daniel Howard, of West Bromwich, who died in April last at the age of 82, left estate valued at £86,118 gross and £81,859 net. Deceased was well known as a gasholder maker, and was one of the Directors of the Anglo-Spanish Gas Company.

ELECTRICAL MANTRAPS.

THE dangers which are continually accumulating by the increase of electrical cables and conductors, were forcibly brought to the notice of the general public when, simultaneously with a report from the Board of Trade respecting three fatal accidents in the North of England, it was announced that a lamentable death had occurred in Marylebone. The Board of Trade Inspector, Major Druitt, R.E., reported upon the circumstances attending the death of a man, caused by coming in contact with the "live rail" of the Lancashire and Yorkshire Electric Railway at Formby; while Colonel Von Donop, another of the Board's Inspectors, reported upon two separate similar fatalities upon the newly electrified section of the North-Eastern Railway Company. These regrettable losses of life call for further protective measures on the part of the Railway Companies, and will cause those who have business near these electrical transmission-of-power plants to be wary. It is, however, to the lessons taught by the Marylebone case that we wish to direct attention—being pertinent to all those of our readers who have to do with gas or water mains.

A digest of the case is as follows: The deceased and other labourers were engaged in removing old electric cables and substituting new ones in Manchester Square. Along with another labourer, the deceased was in a manhole where a cast-iron pipe had to be cut, to admit of the insertion of a new joint-box; and the foreman cautioned them to be careful, as the pipe enclosed a live main. For the purposes of the particular work, deceased used a chisel, a hammer, and a bursting-wedge. The cable was insulated. It was stated at the inquest that the deceased with his chisel first made a small hole in the pipe, and then inserted the bursting-wedge with his hammer. He struck the wedge twice with his hammer, and at the second stroke ejaculated "Oh!" He fell against his comrade, rebounded, and dropped on the pipe. He was immediately removed, but found to be dead. The wedge was discovered sticking straight up in the hole in the pipe. It had penetrated the insulators, with the result that the deceased sustained a fatal electric shock. The Superintendent of Mains to the Metropolitan Electric Supply Company stated that "since this occurrence it had been decided to include hole-boring and wedge-inserting in the category of 'dangerous operations;' and instructions had been issued that the men engaged in this work must wear rubber gloves. It was enough that the bursting-wedge should just enter the pipe; in this instance, it had been driven too far."

The presence of electric cables in the streets of most towns has, up to the present, so far as we are aware, not been productive of any loss of life to the employees of gas and water undertakings; but that the possibility exists is shown indirectly by the Marylebone accident. The probability is greatest where high-tension cables are laid, and where they are only protected by an armour or sheathing and not by a cast-iron pipe. The increasing length of tramway routes has brought into use high-tension currents often of the three-phase type; and in the electrical pressure of 10,000 volts, at which they are worked, lurks a danger which cannot be too carefully guarded against. As is well known, it is a usual practice when searching for the locality of a gas escape—under certain conditions—to test the density of the smell of gas by making test-holes at intervals in the ground covering the length of the main pipe. If the ground surface should be an impervious one—as when covered by asphalte or when under snow and ice—the necessity for this method of boring is accentuated, and the trial-bar has often to be driven by a sledge-hammer. If the trial-bar (which is necessarily pointed) is driven through the sheath or pipe covering the cable, then the conductor will in all probability be touched, and the result to the workmen will depend upon the nature of the current passing through the wire. With the high-tension current, there is no doubt that death would result instantaneously; while with the lowest tension there would be, to say the least, a severe electric shock. While a cast-iron pipe affords considerable protection, it does not avert the possibility of mischief; and therefore steps should in all cases be taken to keep clear of all cables when engaged in the boring operations we have referred to.

Especially desirable is it that a record of the exact position (in plan and section) of every high-tension cable should be kept at the gas and water offices, and that the foreman and all responsible workmen in the distribution departments should know of these plans, and of the danger. We are aware of this course being adopted at the suggestion of an electrical engineer having charge of such high-tension mains; and we would direct serious attention to the necessary precautionary measures, in order to prevent any such loss of life as might, with adequate foresight and organization, have been avoided in Marylebone. The increasing congestion of the underground of roadways in towns has now become serious, by reason of the electric light, tramway, telephone, telegraph, and other cables and pipes; so that, on this account alone, it is desirable to have a record. But when it is remembered that a man digging in ignorance of their whereabouts may incur serious injury, then the need becomes undeniable. Further, if work must, of necessity, be done near the high-tension cables, then it would appear desirable that the workmen using picks or shovels should wear rubber gloves or have other equivalent means for their protection.

VISIT OF THE JUNIOR INSTITUTION OF ENGINEERS TO GERMANY.

A PARTY numbering about 35 members of the Institution, who were accompanied by their Chairman, Mr. Samuel Cutler, jun., M.I.Mech.E., the Vice-Chairman, Mr. Adam Hunter, Assoc.M. Inst.C.E., and the Secretary, Mr. Walter T. Dunn, left London on Friday, Aug. 12, for Dusseldorf, which formed the starting-point for their summer meeting in Germany. As the programme included visits to two important gas-works, and the water and sewage works of Frankfort, this section was well represented by members connected with the staff of Messrs. Humphreys and Glasgow, Messrs. W. A. Valon and Son, the Hemel Hempstead Gas Company, Mr. F. R. Deerham, Assoc.M.Inst.C.E., of Frankfort (Assistant to Mr. W. H. Lindley, M.Inst.C.E., F.G.S.), and Mr. E. E. Cutler.

The tour opened under auspicious circumstances with a reception at the Town Hall by the Burgomaster of Dusseldorf, who had invited the Presidents of the Institution of German Iron-founders, the Lower Rhine District of German Engineers, and the Dusseldorf Institution of Architects and Engineers, to meet the members. The proceedings were opened by an address by the Burgomaster in which he stated that the visit of the Junior Institution of Engineers could not be passed by without being noticed by the Dusseldorf Municipality, because England was the native land of modern industries and techniques. It had been the teacher of all peoples in this respect; and in the Institution's journey through the industrial centres of Germany, and in the study of the German methods, it would be found that these developments had taken parallel lines with the developments of the same industries in their native land. In latter times, one often heard the remark and the wish expressed that the warlike struggle of nations must be ended, and that wish was already being partly brought about by the struggle for peace. But there was yet much to be done. The Chairman (Mr. Samuel Cutler, jun.), whose residence in Germany some years ago made him a master of the German language, replied to the address in that tongue; and this was evidently much appreciated.

The presence of the Junior Engineers seems to have made itself felt in Germany. Immediately after their arrival, it was the subject of Press comments, one or two specimens of which are very interesting. One was as follows:—

It is understood that the Junior Institution of Engineers are visiting some of the industrial works in Hanover, Westphalia, and the Rhine Land. What is the object of this visit? It wants to give its members instructive proof to what degree of efficiency German intelligence and chiefly German technique has reached, and how this has been accomplished. Certainly a most praiseworthy object; but one asks, Is such a visit beneficial to our German industry? To this, we must reply in the negative. It is not only useless to us, but very dangerous, and dangerous because their object is to see the excellent equipment of our workshops, and then to use it in competition with us in the world's market. Further, it is harmful because our experience, which has been acquired by long years of investigation, meeting with endless difficulties and often with great expense, gets into the hands of our greatest competitors. Many of our manufacturers have been saying this for a long time in the interest of the German trade, and one must be warned not to let foreigners have too much insight into our factories. Englishmen themselves teach us this policy. For instance, the Association of Fine Cotton Spinners strictly prescribes that no "foreigner" shall be allowed to visit the works; and are they not right in this? We must therefore follow their example, and deal with the question in the same manner. At the same time, we hope the Junior Institution of Engineers will be received with German hospitality; but the German industry will be best suited if they carry out what we have suggested.

It was, however, a source of gratification to read the following, which appeared the following day in a contemporary:—

Will you permit a representative of German, and especially of Hanoverian, industry to say a word concerning the sentiments expressed regarding the visit of the Junior Institution of Engineers to Germany, and also with the object of preventing people from believing that the German industry as a whole sympathizes with that opinion. The contrary is the case. The visit of the Junior Institution of Engineers to our German industrial centres is of the greatest advantage to the German trade generally; and it is only through these visits that the attainments of German industries will be made known in the wildest fields. We have for a long time abolished the policy of the "closed door;" and the greatest and most important of German industrial institutions which are recognized in the world's market, put up on their doors "Everyone is welcome here." The great expanse of German trade has been partly due to the excellent equipment of factories and workshops, and the care and comfort given to workmen, which is always kept in mind. In a time when everything of interest is published to the world through the medium of the technical press, and in the time when numerous foreign inspectors remain in our works for weeks or months at a time where they are engaged on work being carried out by these firms for foreign countries, it is impossible for the German industry to advance in secrecy alone. And, Heaven be praised, there are a diminishing number of those who still adhere to the old principle. Therefore let me repeat that the German industry, in its overwhelming majority, rejoices in the visit of the Institution of Junior Engineers, and welcomes them most heartily. The Institution will not only be received hospitably; but we will make it our business to lay before our foreign guests as imposing an array as possible of our knowledge and ability—thus only reciprocating what the German engineers experience when visiting England.

A varied programme of visits had been arranged to important works—each representative of its kind, and which afforded not only an excellent opportunity to the Junior Engineers to obtain an insight into almost every branch of German engineering, but to see the most modern methods, plant, factory equipment, and management that German capital employs. The Chairman of the Institution has been in close touch with Germany ever since he superintended the erection of a gasholder at Hanover, some fifteen years ago, at which time that holder was the largest on the Continent; and, incidentally it may be remarked, his firm still holds the record as the constructors of the largest holder on the Continent—that is the one which was removed from Vienna, and re-erected at Mariendorf (Berlin). Well in Mr. Cutler's opinion, Germany has of late made enormous strides, evidence of which is not only marked in engineering, but in all industries, and city improvements are not the least important. Enterprise has become the factor, suggested no doubt from America, but carefully remodelled upon a solid basis, so as to ensure a continuance of good results. It was especially noticed that the managers of the various departments of the engineering establishments, without exception, had spent a year or so both in American and English works, and willingly acknowledged the great practical experience they had gained, and which they now admitted they were combining with German methodical thoroughness—forming in all probability the best combination for successful business.

As an instance of enterprise, it was learnt that an important gas-works in Germany recently invited tenders for an extensive scheme of coal-handling plant, including unloading cranes, aërial ropeway transport, storage fields, and conveying plant to the retort-house. A firm who holds a high reputation for gas-works apparatus tendered among others, but was unsuccessful. Another firm not generally known as gas-works contractors obtained the order. Within a short time, the unsuccessful firm had secured the best equipped and largest works of its kind in Germany, where a speciality was made of this particular class of work; thus enabling them to compete successfully for future work of this nature in gas-works.

A fact which was observed to be the rule, without exception in all the establishments visited, was the large proportion of staff employed in relation to workmen in the shops. In the opinion of Herr Spiecker, one of the Managing Directors of the well-known firm of Siemens and Halske, the proportion of a well-conducted manufacturing establishment should be one member of staff to six workmen. The Beurather Crane Works state that they employ 300 men, with a staff of 70, 45 of whom are engaged in the drawing office. Messrs. Körting Bros., of Hanover, employ 2500 men, with a staff of 500. Probably the most modern individual shop was seen at Messrs. Körting's well-known gas-engine works; a recent extension having been made there for dealing with gas-engines of the higher horse powers. The feature of this shop is that the whole floor is practically one universal bed-plate, on which the self-contained motor-driven machine-tools can be moved about by the overhead travellers, so as to suit the work on hand. For instance, a gas-engine casting is brought in from the foundry, and placed in any convenient vacant space. The boring. planing, drilling, and shaping machines, some weighing as much as 15 tons each, are brought up and fixed so as to practically surround the gas-engine—all doing their respective work at the same time.

One noticed in several works, and perhaps more especially at the modern Hanover locomotive works (where some 2600 men are employed) that the rule is for one man to attend to a large number of machines. It was quite a common thing to see one man keeping three planing machines at work simultaneously. What a pity it is that English engineering works encounter such obstinate refusal on the part of the men to attend to more than one tool at once. However, the net result is that these works can, and actually do, turn over their capital four times in the year; whereas they boast of a comparison with an English firm in the same trade and similar size works, only turning it over once. The workman perhaps is not alone to blame, but he has a very great deal to do with it.

Among the Institutions visited was the Royal Technical High School of Charlottenburg. The noble range of buildings, with its celebrated collection of apparatus in the various departments, greatly interested the visitors. Here there are about 4500 students attending, with a staff of 500. The engineering laboratory contains representative gas, oil, and steam engines of every type, aggregating to over 800-horse power, with corresponding boiler plant. This affords a unique opportunity for students to test under actual working conditions every type of motive power plant. The most striking feature of the course of instruction is the relatively large amount of time devoted to machine construction, including graphic statics, descriptive geometry and lectures upon various forms of machines, under Professor Riedler, who carries on a large engineering practice in the building, employing about thirty draughtsmen for the purpose. Most of them take part in the teaching; so that the subject is taught by practical draughtsmen engaged for the greater part of their time in actual designing. Thus the students work under actual drawing-office conditions.

This visit formed an interesting conclusion to the week's tour of inspection. It is here, or in similar institutions (of which there are several examples in Germany), that the younger men occupying responsible positions in the management of the works

visited during the week were trained; and it is a very open question if the apprentice or pupil who, in this country (often enough paying a heavy premium to the firm he is articled to, which is a considerable source of profit to the firm), goes through his years of practical training in a workshop, and at the same time attends local evening classes, is really making the best use of his time, no matter how large or varied the character of the work carried out by engineering firms to whom the pupil finds himself articled. Rarely has he the opportunity of widening his knowledge beyond the particular manufactures undertaken by the firm, with, of course, an entire absence of the scientific and technical side of the subject.

Mr. L. Körting, the Engineer of the Hanover Gas-Works, very kindly made all the arrangements for the convenience of the members' stay in that beautiful city. At his invitation, a special electric tramcar was placed at the disposal of the Institution, which greatly facilitated the journeys from one works to another. The gas-works, of course, was included in the programme; and there the Paris charging-machine was seen at work. Mr. Körting also kindly provided carriages for a drive to Herren Lausen. His thoughtfulness was much appreciated, as the outing formed a pleasant ending to a hard day's work—four large engineering establishments having been inspected in the one day.

The Mariendorf Gas-Works of the Imperial Continental Gas Association were visited on the Saturday; and there the members were received by Mr. E. Korting, in the absence of Mr. E. Drory through illness. The whole morning was taken up in viewing these modern works. Great interest was shown in the new gasholder in course of construction. The Berlin Anhaltische Company are the contractors. They are proposing to rivet the whole of the side sheets with pneumatic riveters, and are putting plant down to deal in this manner with 40,000 rivets per diem. The gasholder when completed will be the largest on the Continent. At the conclusion of the visit, the members were entertained to luncheon by the Directors of the Imperial Continental Gas Association—Mr. E. Korting presiding.

It will be seen from this survey of the week's doings that the members had a full programme; and from the educational and recreative point of view all who took part in it derived the fullest satisfaction.

PROFIT-SHARING AND TRADE PROBLEMS.

[Communicated.]

Although it has now become a commonplace to say that the example of the South Metropolitan Gas Company has proved the utility of the profit-sharing system as it has never been proved before in this country, it must be admitted that this example finds little imitation, whether in the gas or any other industry. A few companies and individual employers have been infected with Sir George Livesey's enthusiasm. Here and there are works in which the system is being tried—sometimes with good and sometimes with indifferent results. But, speaking generally, profit-sharing as an industrial policy does not make great headway. In theory, most employers would no doubt be found to agree with Sir George Livesey, that the existing wages system does not tend to get the best out of the men. Theoretically, too, most employees would gladly welcome a plan which would give them the direct interest in their work which few experience under present conditions. It is as true in one works as in another, that "if you can get the hearty and loyal co-operation of your people, you will do much better than if they are indifferent."

One knows only too well the workmen who in more than one sense may be classed as indifferent. Travelling the same dreary round year after year, they do just the absolute minimum of work, dawdling when the foreman is out of sight, needing a lot of preparation for starting, but keeping one eye on the clock and always ready to rush away when it is time to knock off. It is grudging, unwilling service, because no other kind of service seems called for. The interests of the man seem to him far removed from those of the master. So much or so little work for so much or so little pay practically sums up in such cases the whole relationship of capital and labour. Trades Unions do little or nothing to encourage a higher ideal. The philosophy of these associations is based on the principle of getting for their members the highest wages which can be squeezed out of the employers; and it is not doing all of them an injustice to say they encourage the "go easy" methods which keep the smarter workmen to the level of the slower men's stroke. From the worker's point of view, perhaps things do not look much better. He sees in the employer only one who is bent on exacting the utmost amount of toil, paying as little as he must, and caring no more for those whom he employs than for his machines—if, indeed, he cares as much. It is true that in large works it is impossible to maintain the personal relations of master and man which grew up in the small workshops of former days; but there is surely not much to be said for the system which has been evolved under modern factory conditions, in which there is, on the one hand, grudging service, and, on the other, indifference to all which concerns the worker, except his power as a producer.

Of the various devices for setting the relations of employer and employed on a better footing, profit-sharing has the advantage of being most readily adapted to existing conditions of employment. It places no restriction upon the liberty of anyone. If there are good qualities in a man, it tends to bring them out; while it is free from those conditions of restraint which, it is to be feared, make certain of the best model village and other semi-philanthropic schemes a little irksome to some who experience them. Why, possessing these advantages, profit-sharing makes such slow progress it is difficult to tell. One reason, no doubt, is the innate conservatism of both masters and men. The capitalist who finds things hard enough in these days of keen and increasing competition, may be forgiven if he hesitates to add 5 per cent. to his wages bill without reasonable certainty that it will come back in the form of larger output. On the side of the men, there are the Trades Unions, more or less openly hostile to any plan which may tend to weaken their power and influence.

While there is this general opposition to change which makes men rather "bear the ills they have than fly to others that they know not of," in special cases there are the difficulties which to Sir George Livesey and others who have surmounted similar obstacles may seem small, but to those whom they concern are real enough. There is the fear, first of all, of what the effect of proposing such a plan may have upon the workmen considered in the mass as members of a Trades Union. In trades in which the Unions exercise a dominant and almost tyrannical influence—and there are such, particularly in the smaller industries—the employer may question the expediency of making a change which might, for all he can see, strengthen rather than weaken the Union bond. In the second place, there arises the fear that to give more money to men who in ordinary circumstances do not show much wisdom in spending what they get, may only add to their opportunities of dissipation. Not much advantage will be got out of a profit-sharing system if it only means that those who usually keep "St. Monday" will for a week or two each year have money wherewith to celebrate also "St. Tuesday" and possibly "St. Wednesday."

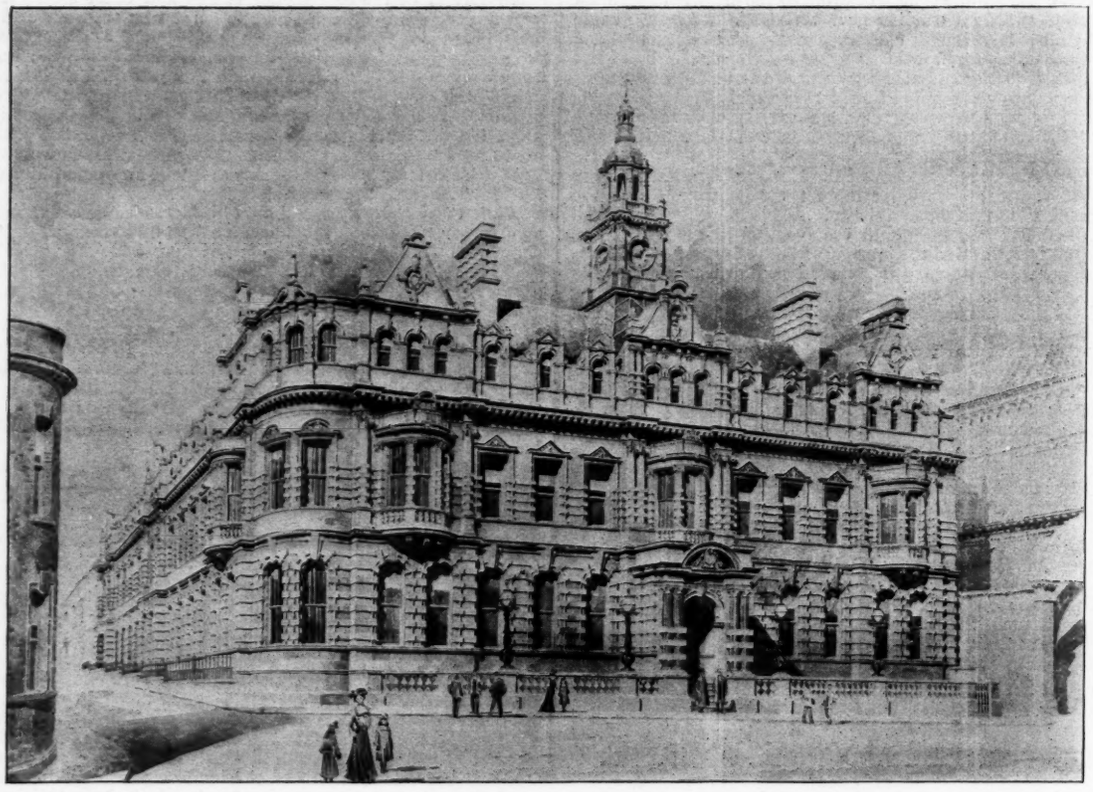
These may seem small obstacles; and the fact that they have been faced and overcome in connection with the South Metropolitan Gas Company and other large concerns, in which the workers represent a large variety of tastes and dispositions, is good reason for believing they might be surmounted in other cases. I have, however, in mind an instance in which these particular difficulties are very prominent. The trade is one of the smallest industries of the country—flourishing in its way, but dependent upon the demands of fashion and changes of seasons, and exposed, like most others, to keen foreign competition. One of the branches of the trade is of a highly technical character, demanding the exercise of no little skill and some thought. No machine has ever been invented to carry it out, and no machine seems likely to be, because of the particular care which is required in selection, which nothing but the eye and hand of the skilled workman are capable of exercising. These workmen, few in number, are organzied in a Trade Union whose rules are so restrictive that no apprentice is allowed to be introduced. Naturally, the result is that the trade does not grow—in fact, if the present policy is persisted in, the time cannot be far distant when it will not only decay, but become absolutely extinct; and another of our industries will have migrated to France or Germany.

This is obviously not a case where tariff can help. What has to be overcome is not the competition of the foreigner, though this is a factor not to be ignored, but the obstinancy and wrong-headedness of British Trades Unionism in the exercise of its supreme strength. Combination among the employers might be a remedy; but such tentative efforts as have been made in this direction have broken down under the pressure of a little spurt in trade. The only alternatives in such a case—which is an extreme one—seem to be the introduction of foreign labour to fill the places which the Trades Union will not allow British workmen to occupy, or the conciliatory method offered by a system of profit-sharing. The problem to be solved is whether profit sharing to the extent of 5 per cent. or so would be a probable solvent of such a difficulty, or whether it would not tend to intensify it, and make the workmen who are so much masters of the situation still more awkward to deal with. This is the question which faces one trade, and possibly more than one; and the fact that there is this kind of problem to be dealt with, may help to explain why it is Sir George Livesey has not more imitators. Perhaps he would say the very fact that there are such difficulties only proves the necessity for the adoption of his system as a remedy for them.

The present year being the Jubilee of the Society of Engineers, we learn from the Secretary (Mr. Perry F. Nursey) that the Council have decided that this epoch in the history of the Society shall be celebrated by a *conversazione*, to be held on the evening of the 16th of November next, at the Royal United Service Institution, Whitehall, where the Society's ordinary meetings are held.

In a recent number of the "Comptes Rendus," MM. Alix and Bay called attention to a frequent cause of error in coal analysis. Coal nearly always contains considerable amounts of calcium carbonate; six samples tested showing a mean of 4·99 per cent., corresponding to 2·06 per cent of carbon dioxide. When the coal is incinerated to determine the carbon content, a correction must therefore be made for the carbon dioxide arising from calcium carbonate, as otherwise the carbon content would not give accurate indication of the fuel value of the coal.

THE NEW OFFICES OF THE BRISTOL GAS COMPANY.



In the "JOURNAL" last week, we published some particulars in regard to the interior arrangements of the new offices which are being erected for the Bristol Gas Company. By the courtesy of the Secretary (Mr. J. Phillips) we are able to-day to give a view of the building, reproduced from a photograph of the perspective which he has placed at our disposal. It will be seen that the building is in the Renaissance style of architecture, of a comparatively plain character, and that the Architect (Mr. W. V. Gough) has not made an excessive use of ornament. The external main frontages will be faced with Bath stone; the lower portions, which are liable to damage by rough usage, being of granite of several tints. As already mentioned, the building will adjoin the Colston Hall; the main frontage being towards St. Augustine's Place, and the flank facing Pipe Lane, the levels of both of which will be improved. As shown on the drawing, the balustrading facing the frontage to St. Augustine's Place will be surmounted by handsome lamp-standards, for the purpose of exhibiting methods of lighting by gas. The centre of the façade is to be crowned by a clock turret; the dials of the clock being illuminated by gas. The new home of the working staff of this old-established Company—one of the oldest in the country—has been designed, as explained last week, to meet all the requirements of modern gas supply; and in presenting a view of it to our readers, we are sure they will unite with us in wishing the Company such increased prosperity as will keep all the Departments fully occupied for many years.

PERSONAL.

Last Saturday, the marriage was solemnized at Leeds of Mr. THOMAS BERRIDGE, the Engineer, Manager, and Secretary of the Leamington Priors Gas Company, with Mrs. EDITH WILSON, of Leamington.

Upon his retirement from the post of Chief Assistant, under his father, Mr. Alfred Colson, at the Aylestone Road Gas, Electric Lighting, and Chemical Works of the Leicester Corporation, to take up his duties as Engineer and Manager of the Weymouth Consumers' Gas Company, Mr. DOUGLAS F. COLSON has been the recipient of handsome parting gifts from the staff and workmen of the undertaking. On Wednesday last, a silver carriage clock, a gold pencil-case, and a kit bag were handed to him by Mr. E. W. Frost, the Superintendent of the Aylestone Road Works, in the presence of the heads of the various departments and representatives from each works and town offices, with general expressions of hearty good will and wishes, not unmixed with regrets at his leaving the undertaking after so long and so happy a connection.

OBITUARY.

The death occurred on the 20th inst. of Mr. G. E. M'DONALD, who had filled the position of Chairman of the Farnham Gas and Water Companies.

We regret to learn of the death of Mr. EDWIN H. WATERFIELD, the Engineer of the Alliance and Dublin Consumers' Gas Company. Mr. Waterfield had to undergo an operation on the 19th inst., and it was successful; but pneumonia supervened, and he died on the following Sunday. Deceased had been in the service of the Company upwards of forty years, for thirty of which he filled the position he held at the time of his death. He is deeply regretted by all with whom he had business relations, as well as by a number of private friends. He leaves a widow and family.

We have to record the death last Thursday, after a short illness, of Mr. W. H. KITSON, the Chairman of the Torquay Gas Company. He succeeded his father in this position, and always showed the keenest interest in the undertaking. A banker by profession, he was for many years head of a local bank bearing his name, which has in recent years been absorbed in one of the larger businesses.

By the death of Sir HENRY STEPHENSON, which took place early last Wednesday morning, at the age of 77, from congestion of the lungs, the Sheffield Gas Company have lost a member of the Board, and Sheffield itself one of its most distinguished citizens. Sir Henry was noted quite as much for his generous philanthropy and his munificent support of the Sheffield University College movement as for his many-sided public work; and his donations to that Institution, and to the Technical School were liberal in the extreme. In recognition of his services, he was one of the first three honorary freemen of the city, the other two being the Earl of Norfolk and Sir Frederick Mappin—Sir Henry's colleague on the Board of the Sheffield Gas Company. At the meeting of the Water Committee of the Corporation on Wednesday, a resolution was passed recording their high appreciation of the valuable services rendered by Sir Henry Stephenson as a member of that body. Deceased is survived by Lady Stephenson and one son, Mr. H. Kenyon Stephenson, who a few years ago was taken into his father's business, and is also a Director of the Gas Company. The funeral took place on Saturday, at the General Cemetery, and was attended by a large number of personal friends and prominent citizens.

GAS PURIFICATION BY AMMONIACAL LIQUOR.

By THOMAS HOLGATE, F.C.S., M.Inst.C.E.

(*Continued from p.* 529.)

GAS LIQUOR.

From the foregoing information, it will now be possible to understand the classification of the components of gas liquor into "free or volatile" at 100° C., and "fixed or non-volatile" at 100° C.

Fixed.		Free.	
Ammonium—		Ammonium—	
,, sulphate	$(NH_4)_2 SO_4$	,, carbonate	$(NH_4)_2 CO_3$
,, thiosulphate	$(NH_4)_2 S_2O_3$	,, hydrocarbonate	$(NH_4) HCO_3$
,, chloride	$NH_4 Cl$.	,, sulphide	$(NH_4)_2 S$
,, sulphocyanide	$NH_4 CNS$.	,, hydrosulphide	$NH_4 HS$.
,, ferrocyanide	$(NH_4)_2 Fe (CN)_6$	,, hydrate	$NH_4 HO$
,, sulphite	$(NH_4)_2 SO_3$	,, cyanide	$NH_4 CN$
,, thiocarbonate	$(NH_4)_2 CS_3$	,, acetate	$NH_4 (C_2H_3O_2)$

The two last named in each of the columns occur so rarely, and are of so little importance in connection with the question of liquor purification, that very little further consideration need be given to them. The cyanide, sulphocyanide, and ferrocyanide are of considerable importance in the question of cyanogen recovery, and in that way are worthy of more extended reference, but for the immediate purpose of these articles, and especially at the present juncture, they may be regarded as to their ammonia content only. The quantity of the sulphocyanide and ferrocyanide is usually from 4 to 10 per cent. of the fixed ammonia, which latter being from 16 to 20 per cent. of the total ammonia, means that the former are usually from 1 to 2½ per cent. of the whole.

The separation into two classes, "fixed" and "free," is determined by the heat of neutralization of ammonia with the several acids concerned; and it may be said that the first three in Table V. (*ante*, p. 529), sulphuric, hydrochloric, and nitric, typify the former, and the second three—viz., carbonic, sulphydric, and hydrocyanic—typify the latter. If the heat of combination be greater than for carbonic acid, then the compound will fail more or less completely to be split up on heating with steam to 212° Fahr. On addition of lime, as may be seen on reference to the same table, the base ammonia is liberated because of the superior heat of combination that lime possesses over ammonia. As shown by Table VI. (*ante*, p. 529), this applies to all compounds except oxalates; and as this class is usually absent from gas liquor, the use of lime is at once effective and cheap.

As to the thiosulphate of ammonium, there exists a doubt as to whether it should be regarded as a "fixed" or a "free" salt. Mr. J. H. Cox has regarded it as "free" [see his paper published in the "JOURNAL" for Oct. 16, 1883, p. 653], whereas Dr. Lunge, as a result of his experiments, regards it as "fixed;" while some tests of purified and unpurified ammoniacal liquor made by the Chief Inspector of Alkali Works appear to indicate that about one-third of the thiosulphate originally present was liberated by heating to 200° Fahr. (See Table VIII.). It is desirable to know with certainty which view is correct, because, although in any case it is not a constituent to be preferred, if lime is required for the liberation of its ammonia, that is an added reason why its formation should be kept as small as possible. It is frequently shown in analyses to account for 5 per cent. of the total ammonia; and there appears to be good reason for believing that it is an oxidation product of ammonium sulphide by contact with air in the washers and scrubbers.

The determination of this constituent has hitherto been beset with difficulties; but the test recently devised by Herr W. Feld, and described in the "Journal für Gasbeleuchtung" (Vol. XLVI.), appears likely to set the quantitative analysis upon a satisfactory basis. The amount of thiosulphate has hitherto been indexed by the sulphur supposed to be contained therein; but the presence of sulphur in other forms has prevented a satisfactory subdivision or allocation to the several compounds. (See reports of the Chief Inspector under the Alkali Works Regulation Acts for 1902, pp. 73 to 75, and 1903, pp. 35 and 36.) Herr Feld's method provides for the determination of sulphur by liberation of sulphuretted hydrogen by means of magnesium chloride from sulphides, and by means of metallic aluminium and hydrochloric acid from thiosulphates and thiocyanates (sulphocyanides). The action of magnesium chloride is not vitiated by the presence of thiosulphate, and thiocyanate and the discrimination between the last two may be accomplished by boiling with a solution of mercuric chloride rendered alkaline by means of magnesia which decomposes the thiosulphate. Details of the method are given in Appendix A. The thiosulphate, the sulphocyanide, and the ferrocyanide do not appear to be generated as such, but are the result of chemical interaction during the processes of condensing and scrubbing; the acids entering into those salts having a greater "strength" than those simple combinations from which they were formed. In contrast to these, are the chloride and sulphate, which, being the result of strong acids present in the nascent gas, are readily removed, even at the higher temperatures of the condenser. It is not unusual for the chloride to represent 75 per cent. of the fixed ammonia or 15 to 20 per cent. of the total ammonia. The quantity of the latter constituent is not dependent upon the methods of washing; but the thiosulphate and sulphocyanide are to some extent determined by those methods.

It is of importance at this juncture to note that when once the ammonia has been liberated by lime in the still of the sulphate-house, there is no objection to its being passed into the stream of crude illuminating gas to take up a quantum of carbon dioxide or sulphuretted hydrogen, inasmuch as these latter will be liberated by steam alone—that is, without lime—from the liquor, when they reach the still. In other words, having once worked upon hydrochloric acid there is no reason why the ammonia should not

TABLE VIII.—*Analyses of Various Samples of Ammoniacal Liquor.*

——	From the Meadow Lane Gas-Works, Leeds.		Unpurified.	Purified.	From the Liquor Scrubber.	From the Clean Water Scrubber.	Unpurified.	Purified.
	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)	(*f*)	(*g*)	(*h*)
Density, deg. Twaddel . .	..	4·15 at 22°C.	4·19	2·8	5·75	2·5	5	2·75
Ounce strength	8·96 = 1·945 × 4·61	..	..	..	..	..	..	..
As chloride	0·401	0·452	..	..	..	..	0·305	0·303
As sulphocyanide	0·020	0·040	..	..	..	..	..	..
As sulphate	0·016	0·005	..	..	..	..	..	..
As thiosulphate	0·088	0·064	(calculated	from sulphur	obtained by	difference.)	0·0367	0·0231
As ferrocyanide	0·002	0·010	..	..	..	..	..	..
Total "fixed" NH_3 . . .	0·527	0·571	0·527	0·493	0·034	0·0425	0·6545	0·6375
,, free NH_3	1·418	1·488	1·088	1·023	1·87	0·5525	1·3345	1·1093
Total NH_3	1·945	2·059	1·615	1·516	1·904	0·5950	1·9890	1·7468
As sulphides.	0·186	0·101	..	..	..	..	..	..
	0·029	..	..	..	..	..	..	..
As carbonates	1·203	1·387	..	..	..	..	..	..
Carbon dioxide	2·194	2·529	1·184	0·154	3·179	0·902	1·348	0·5214
Sulphuretted hydrogen . .	0·186	0·202	0·2935	0·156	0·360	0·251	0·4267	0·2094
Sulphur in various forms .	0·422	0·392	0·548	0·553	0·4813	0 372	0·4707	0·2406
Ratios by weight to the free	NH_3.							
Carbon dioxide	1·54	1·700	1·10	0·15	1·7	1·63	1·01	0·47
Sulphuretted hydrogen . .	0·13	0·136	0·28	0·15	0·19	0·45	0·32	0·18
$CO_2 + H_2S$	1·67	1·836	1·38	0·30	1·89	2·08	1·33	0·65
Ratio of total NH_3 to fixed	NH_3.							
Percentage of "fixed" . .	27·10	27·730	32·60	32·5	1·79	7·14	32·00	36·00

NOTES.

(*a*) Analyzed by Mr. A. W. Cooke, of Messrs. Brotherton and Co.; test of average sample from 6000 tons of liquor taken from the Leeds Gas-Works, Jan., 1901. (See "Journal of the Society of Chemical Industry," Vol. XX., p. 226; also "JOURNAL," Vol. LXXVII., p. 1067.)

(*b*) Analyzed by Mr. Septimus Dyson, at the Yorkshire College. (See "JOURNAL," Vol. XLII., p. 102.) Having estimated the total sulphur and that present as sulphide, sulphite, sulphate, and sulphocyanide, he attributed the balance to thiosulphate.

(*c*) At the Halifax Gas-Works. Liquor from the hydraulic main and condensers, &c., mixed with (*d*), on emerging from liquor scrubber.

(*d*) Liquor as column (*c*), after being purified. Aug. 13, 1900.

(*e*) At the Halifax Gas-Works. Liquor from clean water scrubber pumped into liquor scrubber. Difference between column (*e*) and column (*f*) represents difference due to circulation of liquor through scrubber. Jan. 7, 1902.

(*f*) The low percentage of "fixed" ammonia in this and column (*e*) is accounted for by its coming into contact with gas from which the stronger acids had been removed.

(*g*) (*h*) Of similar origin to (*c*) and (*d*). Tested by Mr. E. Linder. (See report of Chief Inspector of Alkali Works for 1899.)

TABLE IX.—*Ammoniacal Liquor and its Contents in Hydrogen Equivalents (H.E.) per Ton of Coal.*

Source of Ammoniacal Liquor.	No. of Gallons.	Free Ammonia,		Carbon Dioxide,		Sulphuretted Hydrogen.		CO_2 and H_2S.		Percentage of Total Acids.		Ratio of CO_2 to H_2S.
		Per Unit.	Total.	Per Unit.	Total.	Per Unit.	Total.	Per Unit.	Total.	As CO_2.	As H_2S.	
Inlet to condenser . . .	13·3	44·00	585·20	21·20	281·96	10·00	133·00	31·20	414·96	67·95	32·05	2·12
Outlet to condenser . .	4·0	236·80	947·20	189·70	758 80	57·co	228·00	246·70	986·80	76·90	23·10	3·33
Outlet of clean water washer	5·7	104·40	595·08	100·80	574·56	26·10	148·77	126·90	723·33	79·43	20 57	3·86
Total of foregoing into liquor scrubber . .	23·0	92·50	2127·48	70·23	1615·32	22·16	509·77	92·40	2125·09	76·01	23·99	3·17
Calculated increase by use in liquor scrubber .	..	52·26	1138·52	66·56	1531·08	14·04	306·73	80·60	1837·81	82·58	17·42	4·74
Total liquor	23·0	144·76	3266·00	136·80	3146·40	35·50	816·50	172·30	3962·90	79·40	20·60	3·85

Memo.—By multiplying the total hydrogen equivalents for NH_3, CO_2, and H_2S respectively, by ·0017, ·0022, and ·0017, the weights in pounds may be obtained as in the subjoined table.

TABLE IX A.—*Removed by Ammoniacal Liquor from the Crude Gas.*

—	Pounds per Tón of Coal Carbonized.						Percentage of Total Impurity.					
	Ammonia.			CO_2.	H_2S.	CO_2 and H_2S.	Ammonia.			CO_2.	H_2S.	CO_2 and H_2S.
	Fixed.	Free.	Total.				Fixed.	Free.	Total.			
Up to condenser inlet . .	0·559	0·994	1·553	0·620	0·226	0·846	44·82	17·90	22·84	2·18	1·42	1·91
In condenser	0·076	1·608	1·684	1·669	0·388	2·057	6·10	28·96	24·76	5·87	2·44	4·64
Up to condenser outlet .	0·635	2·602	3·237	2·289	0·614	2 903	50·92	46·86	47·60	8·05	3·86	6·55
In scrubber, fed with ammoniacal liquor . . .	0·555	1·939	2·494	3·369	0·521	3·890	44·51	34·92	36·68	11·85	3·28	8·78
In clean water washer . .	0·057	1·012	1·069	1·264	0·253	1·517	4·57	18·22	15·72	4·45	1·59	3·43
Up to purifiers inlet . .	1·247	5·553	6·800	6·922	1·388	8·310	100·00	100·00	100·00	24·35	8·73	18·76
In purifiers	none	none	none	21·500	14·500	36·000	..	..	..	75·65	91·27	81·24
Liberated from coal . .	1·247	5·553	6·800	28·422	15·888	44·310	100·00	100·00	100 00	100·00	100·00	100·00

TABLE IX B.—*Impurities Contained in the Crude Gas.*

—	Pounds per Ton of Coal Carbonized.						Percentage of Impurity Removed, based upon the Composition of the Gas entering the Scrubber, *i.e.*, at the Outlet of the Condenser.					
In gas entering condenser .	0·688	4·559	5·247	27·802	15·662	43·464						
Do. scrubber .	0·612	2·951	3·563	26·133	15·274	41·407						
Removed in scrubber by ammoniacal liquor. .	0·555	1·939	2·494	3·369	0·521	3·890	90·69	65·71	70·00	12·89	3·41	9 39
Do. in washer by clean water	0·057	1·012	1·069	1·264	0·253	1·517	9·31	34·29	30·00	4·84	1·66	3·67
Do. by scrubber and washer	0·612	2·951	3·563	4·633	0·774	5·407	100·00	100·00	100·00	17·73	5 07	13·06
Do. in purifiers	nil	nil	nil	21·500	14·500	36·000	nil	nil	nil	82·27	94 93	86·94
Total removed	0·612	2·951	3·563	26·133	15·274	41·407	100·00	100·00	100·00	100·00	100·00	100·00
Memo. Removed in washer by clean water, calculated upon gas entering that vessel. in gas	0·057	1·012	1·069	22 764	14·753	37·517	per cent. removed		100·00	5·55	1·71	4·04

TABLE X.

—	Degrees by Twaddel's Hydrometer.	Chloride, Calculated as HCl per Cent.	Sulphur. (Grammes per Cent.).		Ammonia.				Carbonic Acid.		Sulphuretted Hydrogen.		Hydrogen Equivalents.			Percentage of Total Acids as H_2S.
			As Thio-Sulphate.	As Sulphide.	Total (per Ct. by Weight).	Fixed (do.).	Free (do.).	Hydrogen Equivalents.	Percentage by Weight.	Hydrogen Equivalents.	Percentage by Weight.	Hydrogen Equivalents.	B *plus* C.	B + C *minus* A.	B + C − A when A equals 100.	
								A		B		C				
(*g*) Unpurified	5	0·654	0·0691	0·4016	1·9890	0·6545	1·3345	78·50	1·348	61·25	0·4267	25·10	86·35	+ 7·85	+ 10·00	29·06
(*h*) Purified .	2¾	0·650	0·0435	0·1971	1·7468	0·6375	1·1093	65·25	0·5214	23·70	0·2094	12·32	36·02	−29·23	− 44·79	34·20

afterwards work upon the weaker acids sulphuretted hydrogen and carbonic acid.

Free Ammonia.

As is well known, the presence of *absolutely free* ammonia in gas liquor is represented by the hydrate, which is usually to be found in liquor drawn from the condensers, and if present in the liquor after use in the scrubbers is an indication that the liquor has not been fully utilized. Next in order of "freeness" or readiness to dissociate under heat come the cyanide, the sulphides and the carbonates—the order of magnitude usually following the same sequence, but inversely. The carbonates are dissociated at 58° to 60° C. (136° to 140° Fahr.), and the sulphides at about 35° C. (95° Fahr.); while the cyanide is split up into ammonia and hydrocyanic acid at a still lower temperature.

The relative proportion of the compounds of ammonia, subdivided into fixed and free, is well shown by analyses (*a*) and (*b*) in Table VIII., as they are upon the average production over a period of time at one of the Leeds Gas-Works. Alongside these are placed some analyses, less detailed, of ammoniacal liquor from West Yorkshire coal at the Halifax Gas-Works.

From what has gone before, it will be quite understood that the relative quantities of these three acids that will be taken up by washing with ammoniacal liquor will depend—

1.—Upon the "avidities," which are in the order CO_2, H_2S, HCN, the latter being almost *nil* when compared with hydrochloric acid.

2.—Upon the "heats of neutralization," which are in the order CO_2, H_2S, HCN, and which determine the tenacity with which the respective compounds resist the decomposing influence of an increase of temperature.

3.—Upon the "volume solubilities," which are in the order HCN, H_2S, CO_2—the reverse of the preceding functions.

4.—Upon the "volume solubilities" as affected by rise of

temperature, which, as shown in Table III. (*ante*, p. 528), are distinctly in favour of H_2S in comparison with CO_2.

5.—Upon the relative quantities of the three acids present in the crude gas brought into contact with the ammoniacal liquor, and the relative quantities of the acid constituents of that liquor.

The maximum benefit from washing will be greatest when the largest percentage of carbon dioxide is extracted from the gas in preference to hydrogen sulphide; and this will be facilitated by keeping both the crude gas and the ammoniacal liquor at a low temperature, and bringing into use liquor containing as much ammonium hydrate as possible. The effective absorption of carbon dioxide will also be facilitated by avoiding the formation of thiosulphate; and to this end it is manifestly desirable that any air intended to assist purification should be admitted after the scrubbers, and in measured quantity to the particular lime or oxide boxes where its presence will be most beneficial.

The quantity of carbon dioxide and sulphuretted hydrogen that will be absorbed by a given quantity of ammonia will depend upon the time of contact of the liquor with the crude gas; for that will determine whether the normal or the acid compounds will be formed, and in what proportion.

$$\begin{cases} (1)\ 2\ NH_3 + H_2O + CO_2 = (NH_4)_2\ CO_3. \\ \qquad 34 + 18 + 44 = 96. \\ (2)\ 2\ NH_3 + H_2S = (NH_4)_2\ S. \\ \qquad 34 + 34 = 68. \end{cases}$$

$$\begin{cases} (3)\ 2\ NH_3 + 2\ H_2O + 2\ CO_2 = 2\ NH_4\ HCO_3. \\ \qquad 34 + 36 + 88 = 158. \\ (4)\ 2\ NH_3 + 2\ H_2S = 2\ NH_4\ HS. \\ \qquad 34 + 68 = 102. \end{cases}$$

The foregoing equations show how 34 parts by weight of ammonia may combine with carbon dioxide and sulphuretted hydrogen. The first pair show normal salts; while the second pair show an absorption of double the quantity of acids producing "acid salts." To produce the latter, it is necessary that in the crude gas carbon dioxide and sulphuretted hydrogen should be in excess relative to the ammonia, and that time, temperature, and contact with the liquor should be favourable. The extent to which it can be carried in practice will be discussed in the next paragraph; but, meanwhile, the method of ascertaining and recording the action that does take place must be referred to. To find out by analysis the exact state of combination of sulphuretted hydrogen or carbon dioxide with ammonia is a most tedious process, owing to the large number and changeability of those substances. All practical requirements are met by ascertaining the weight of ammonia, carbon dioxide, and sulphuretted hydrogen separately as gases when liberated under suitable conditions from a definite quantity of the liquor. By stating the percentages by weight, and deducing from these the "hydrogen equivalents," it can be seen whether the saturation to normal salts has been reached, or super-saturation to a certain proportion of acid salts attained.

NH_3	H_2S	CO_2
2 molecules = 34	1 molecule = 34	1 molecule = 44

represent the power of these gases to replace the molecule of hydrogen (2 parts by weight) in passing in and out of combination. The "hydrogen equivalents" present of each of these gases are therefore found by dividing the percentage weight by $\frac{34}{2} = 17$ for NH_3, $\frac{34}{2} = 17$ for H_2S, and $\frac{44}{2} = 22$ for CO_2. Tables IX., IXA, IXB, and X show the use of this method.

Quantitative Action.

Having seen the nature of the chemical actions involved, and that the problem of the purification of gas centres round the combinations of ammonia with carbon dioxide and sulphuretted hydrogen, we must now refer to the quantities of these substances to be dealt with. A ton of Newcastle coal yields on distillation an average of 6¼ lbs. of ammonia, 15 lbs. of sulphuretted hydrogen, and 30 lbs. of carbon dioxide. Of the 6¼ lbs of ammonia, ¾ lb. is combined with other acids (stronger); leaving 5½ lbs. to do the work which by ordinary methods would take 38 lbs.* As shown above, 34 lbs. of NH_3 combine with 34 lbs. of H_2S or 44 lbs. of CO_2 when normal salts are produced; but only 17 lbs. of NH_3 are required to effect the same when acid salts are produced. These may be expressed as simple ratios as follows:—

	NH_3.	H_2S.	CO_2.	proportions by weight for
(1)	1	1	1·3	normal salts
(2)	1	2	2·6	acid salts

On the least satisfactory scale of absorption (1), and excluding the fixed ammonia, the ammoniacal liquor would need to be perfectly revivified six times, or on the ideal scale of absorption (2) would need to be purified three times. If the fixed ammonia be brought into use, these figures would be 5 and 2 respectively; and if we assume a practicable scale of absorption with a reasonable percentage purification of the liquor, we may expect to have 4 as the minimum number of circulations of the ammoniacal liquor required to remove the bulk of the carbon dioxide and sulphuretted hydrogen.

To follow this out more closely, the particularized account of work done with Midland and South Yorkshire cannel and coal at Nottingham by Mr. Lewis T. Wright must now be investigated. The calculations are based upon the data to be found in the "Journal," Vol. XLVIII., p. 280, *et seq.*, which are valuable on account of the quantity and quality of the liquor from each source being stated in full.

Table IX. shows in detail where the ammoniacal liquor originated and the amount of work done by it as indicated by the hydrogen equivalents. It shows also the ratio between the acid gases absorbed; that figure (the last column) becoming greater as the coolest portion of the plant is reached, and becomes greatest —viz., 4·74—in the work done by the liquor scrubber. Table IXA shows that up to the outlet of the condensers there is abstracted nearly one-half of the ammonia, but only 6·55 per cent. of the acid gases. The liquor scrubber contributed 8·78 per cent. and the clean water washer 3·43 per cent., or together 12·21 per cent. of the acids; making a total removal of 18·76 per cent., and leaving the large proportion of 81·24 per cent. to be dealt with in the purifiers. The same abstraction is shown in Table IXB, but is there given as a percentage of that present in the crude gas entering the scrubber.

By means of 6·8 lbs. of ammonia per ton of coal, of which 1·247 lbs. were "fixed" and 5·553 lbs. were "free," 6·922 lbs. of CO_2 and 1·388 lbs. of H_2S, or 8·31 lbs. of the two acid gases, were removed, leaving 21·5 lbs. of CO_2 and 14·5 lbs. of H_2S—a total of 36 lbs.—to be removed in the purifiers. These figures are in general agreement with those ascertained by Mr. Cox, when the difference in the coal is remembered; and they probably represent good working—showing an absorption which is higher than that corresponding to the production of normal carbonate and sulphide. The large proportion of work done in the liquor scrubber brings the hydrogen equivalent of the acids in the total liquor (only 23 gallons) to 172·3, against 142, the hydrogen equivalent of ammonia—an excess of 30·3 hydrogen equivalents over the requirements of normal salts, representing $\frac{30{\cdot}3 \times 100}{172{\cdot}3} = 17{\cdot}6$ per cent. of the work done, or a surplus of $\frac{30{\cdot}3 \times 100}{142} = 21{\cdot}33$ per 100 hydrogen equivalents of ammonia. Mr. Wright showed that, with a similarly effective absorption, he would need to revivify the 6·8 lbs. of total ammonia 3·77 times to denude the gas of the remaining carbon dioxide and sulphuretted hydrogen. How the whole of the ammonia (fixed and free) could be utilized to effect this, he did not dwell upon; but of its possibility he had not the least doubt.

Recent investigations by the writer show that with Durham coal, as carbonized in Metropolitan gas-works, the following figures represent the average quantity at the outlet of the condensers: 3·5 lbs. NH_3, 20 lbs. CO_2, and 9 lbs. H_2S per 10,000 cubic feet of gas. With such gas, three revivifications of the liquor would be sufficient, provided the use made of the liquor was as good as that mentioned in the Nottingham case. Recent analyses of ammoniacal liquor from (*a*) Leicester and (*b*) Old Kent Road (London) show in the former a deficiency of 2·87 and in the latter of 1·4 per cent.—figures which, when contrasted with those for Nottingham, show a disparity of 24·20 and 22·73 per cent. respectively. The expression used as to revivifying a liquor a certain number of times may be misunderstood, unless it be pointed out that what is meant is the revivification of such a multiple of the quantity of liquor ordinarily produced per ton of coal, which multiplied quantity may be put into circulation and purified at one operation. In other words, a stream of liquor need not be purified (say) four times in succession, but a stream of four times that ordinarily produced may be purified once, with equal efficiency; and this is the course which the writer has pursued in the practical work hereinafter referred to.

(To be continued.)

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* Much valuable information relating to these data was given by Mr. J. H. Cox in the "Journal," Vol. XLII., p. 656). T. H.

Appendix A.

Feld's Method of Quantitative Analysis for Sulphur in Various Forms.

Sulphides, Thiosulphates, and Thiocyanates (Sulphocyanides).

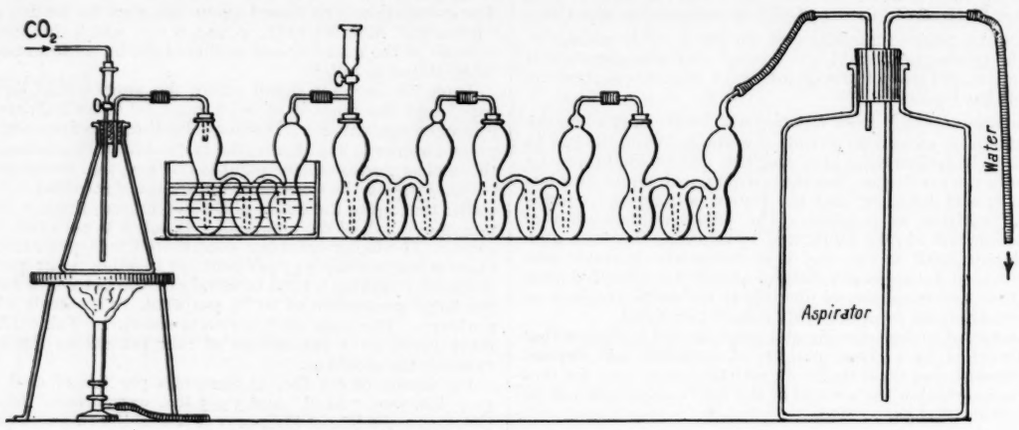
In determining the sulphur in these forms, it is in each case liberated in the form of sulphuretted hydrogen, which is received in iodine solution and determined by back titration. The illustration (next page) shows the apparatus used.

The distilling flask is connected to a supply of carbon dioxide and to a series of bulbs, the first set of which is empty, and serves to condense the distilled water, the second and third containing $\frac{N}{10}$ iodine-potassium iodide solution, and the fourth containing $\frac{N}{10}$ thiosulphate solution. Air is swept out of the apparatus by means of carbon dioxide before the distillation begins, and a current of the gas is maintained during the operation.

Sulphides.

In this case, magnesium chloride is used for expelling the sulphuretted hydrogen by direct distillation; the reaction proceeding as follows:—

$$2\ NH_4SH + MgCl_2 + CO_2 + H_2O = 2\ NH_4Cl + MgCO_3 + 2\ H_2S.$$



FELD'S APPARATUS FOR SULPHUR ANALYSIS.

Other sulphur compounds are not attacked by magnesium chloride. If cyanide be present, hydrocyanic acid is liberated, and in this case it is only necessary to add to the iodine solution in each set of bulbs about 2·5 cc. of 4 N hydrochloric acid to prevent the formation of iodine cyanide. At the end of the distillation, the excess of iodine is titrated directly by thiosulphate solution, with starch as indicator.

THIOSULPHATES AND THIOCYANATES.

If these salts be distilled with strong hydrochloric acid in presence of aluminium, the sulphur is expelled quantitatively as sulphuretted hydrogen in the equations—

(1) $3(NH_4)CNS + 4\,Al + 18\,HCl$
Ammonium sulphocyanide + Aluminium.
$= 3\,NH_4Cl + 2\,Al_2Cl_6 + 3\,NH_4Cl + 3\,C + 3\,H_2S$
Ammonium chloride + Alum chloride.

(2) $3\,(NH_4)_2S_2O_3 + 8\,Al + 30\,HCl$
Ammonium thiosulphate.
$= 6\,NH_4Cl + 4\,Al_2Cl_6 + 9\,H_2O + 6\,H_2S.$
Ammonium chloride.

Six small coils of sheet aluminium, made of strips about 20 centimetres long and 0·5 centimetre broad, are placed in the flask (shown in the diagram) along with the substance under examination, and about 100 to 120 cc. of water. Into the boiling solution 20 cc. of 4 N hydrochloric acid are run; and after the violent evolution of hydrogen has ceased, further quantities of acid are added, until no further decolorization of the iodine solution occurs. A gentle stream of carbon dioxide is maintained during the distillation. The excess of iodine is then titrated. If *both* thiosulphate and thiocyanate are present, the latter must be determined as below, and the thiosulphate found by difference.

SEPARATION OF THIOCYANATE FROM THIOSULPHATE.

If a thiosulphate be boiled with a solution of mercuric chloride rendered alkaline by means of magnesia, the *thiosulphate is completely decomposed*, as follows:—

$(NH_4)_2S_2O_3 + HgCl_2 + MgO$
Ammonium thiosulphate + Mercuric chloride + Magnesia
$= 2\,NH_4Cl + HgS + MgSO_4.$
Ammonium chloride + Mercuric sulphide + Magnesium sulphate.

Under these conditions, thiocyanates (sulphocyanides) are unaffected.

In analyzing a mixture of thiosulphate and thiocyanate, therefore, the substance is boiled for about ten minutes with a mercuric chloride—magnesium chloride solution, to which some magnesia has been added. (The solution of mercuric chloride employed is mixed previously with magnesium chloride in the proportion of one molecule of mercuric chloride to three or four of magnesium chloride.) After cooling, the liquor is diluted to a definite volume, filtered through a dry filter, and an aliquot portion of the filtrate, which contains the thiocyanate alone, distilled with hydrochloric acid in presence of aluminium, as already described.

SELF-CARBURETTING AT THE MARIENDORF GAS-WORKS.

In the course of his lecture before the Irish Association of Gas Managers a fortnight ago, Professor Lewes referred to some experiments recently carried out at the Mariendorf (Berlin) Gas-Works, with a new water gas and auto-carburation plant. He mentioned that the results would likely soon be given by our German contemporary—the "Journal für Gasbeleuchtung;" and they duly appeared in the number of that periodical for the 20th inst. We append a translation of the report, which is signed by Messrs. E. Drory and E. Körting.

The demand for gas on the part of the population of most large towns in Germany, but more especially of Berlin, has of late years risen in far higher proportion than that for coke. The consequence of this is a regrettable depreciation in the price of this leading bye-product of gas manufacture, which is the more unpleasantly felt in the balance-sheets from the fact that the Syndicates are striving to keep up the price of coal at a permanently high level. It is consequently only natural that there is widely spread among technical men in the gas industry the view that water gas is the only help out of the difficulty. The duty on mineral oil in Germany is, however, so high that the towns which decided on adopting oil-carburetted water gas are able to show hardly any economic advantage. Carburetting with benzol—notwithstanding its relatively low market value—is also too costly to be thought of seriously. As far as Germany is concerned, at the present time self-carburetting is the only process that can be taken into consideration from the economical point of view—that is, if its results are really all its supporters claim for it, but which its opponents absolutely disbelieve. It would be obviously in the public interest, and facilitate a solution of this burning question, if the results of trials were published from all sides. To this end, all the comparative trials made with the new water gas and self-carburetting plant at the Mariendorf Gas-Works at the latter end of June and the beginning of July this year are now published. Further experiments are projected for the autumn.

The water gas is blown in at the upper mouthpieces of the inclined retorts, which are 4·8 metres (15 ft. 9 in.) long. The retorts are disposed in three rows, according to height—viz., the upper, the middle, and the lower. A charge of coal is worked off in 5½ hours, or 330 minutes. Therefore, one of the three rows of retorts in a bench of eight settings is emptied and recharged every 110 minutes; and the introduction of the water gas into a row of retorts was continued for the same period. As soon as the stoker, therefore, has charged a retort with coal, he opens the water-gas cock attached to it, and closes that of the retort above or below which was charged last. About 25 volumes of water gas should be added, on an average, to every 100 volumes of coal gas. This quantity is sufficient to double the rate of flow of the gas issuing from the retort during the first 110 minutes. According to the experience up to now of the German Water-Gas Company, the same effect is obtained when 50 volumes of water gas to every 100 volumes of coal gas are allowed to enter every second setting, and considerable saving is effected thereby in manipulation and wear and tear. In the case of the following experiments, only one single bench of eight settings was brought into action for two weeks, with a productive capacity of about 30,000 cubic metres (1,059,513 cubic feet) of coal gas, or 37,500 cubic metres (1,323,750 cubic feet) of mixed gas, per 24 hours. All the retorts in this bench were provided with water-gas cocks.

In order to obtain comparative tests, coal gas alone might have been made for a certain number of hours in these settings, stored in a gasholder, and tested for its caloric power; and the holder then emptied, similarly filled with mixed gas, and tested anew. Unfortunately, there was but one gasholder at our disposal, with a capacity of 108,000 cubic metres (3,814,000 cubic feet), which could not be emptied, for obvious reasons. The only thing that could be done was to test the gas at regular intervals during the production. The gas to be tested was taken from the main outlet of the purifiers every 15 minutes. During these trials, the settings had, of course, to be kept at uniform heats, the same sort of coal carbonized, and, in short, all the conditions kept as constant as possible. For instance, to insure this, at 8 a.m.—a

certain time after the charging of the lower row of retorts—the testing of the coal gas with the calorimeter was commenced and continued for several hours. In the afternoon, when the lower retorts came round again for charging, the water gas was blown into the retorts, and the testing of the mixed gas commenced at similar intervals as in the morning, and continued for as many hours. At the next trial, the mixed gas was tested in the morning, and the coal gas in the afternoon, &c. The table below shows the results of such a trial.

TABLE OF TESTS OF COAL GAS AND MIXED GAS, JULY 6, 1904 (BAR 30 IN.).

COAL GAS.

Only coal charged from 8 o'clock.

Time. a.m.	Row of Retorts Charged.	Gas Temperature.	Calorific Power. Gross.
		Deg. C.	Calories per Cubic Metre.
First Test 8.15		16·0	5082
8.30		16·0	5072
8.45	Lower	16·0	5304
9.0		16·0	5280
9.15		16·0	5418
9.30		16·0	5089
9.45		16·0	5022
10.0		16·0	5026
10 15	Middle	16·5	5103
10.30		16·5	5349
10.45		16·5	5488
11.0		17 0	5303
11.15		17·0	5220
11.30		17·0	5215
11.45		17·5	5320
12.0		17·5	5549
12.15	Upper	17·5	5478
12.30		18·0	5313
12.45		18·0	5297
1.0		18·0	5168
	Average	16·75	5255
	Corrected to 15° C. and for tension of aqueous vapour		5297

MIXED GAS.

[80 per cent. of coal gas, 20 per cent. of water gas.]

Water gas introduced from 1 o'clock.

Time. p.m.	Row of Retorts Charged.	Gas Temperature.	Calorific Power. Gross.
		Deg. C.	Calories per Cubic Metre.
First test 1.45		18·5	5082
2.0		18·5	5216
2.15	Lower	18·5	5098
2.30		18·5	5016
2 45		18 5	4898
3.0		18·5	4850
3.15		18·5	4736
3.30		19·0	4786
3.45	Middle	19 0	5082
4.0		19 5	5160
4.15		19·5	5096
4.30		19·5	4896
4.45		20·0	4810
5.0		21·5	4784
5.15		21·0	4956
5.30		21·0	5228
5.45	Upper	21·0	5181
6.0		21·0	5036
6.15		21·5	4976
6.30		21·5	4897
	Average	19·8	4989
	Corrected to 15° C. and for tension of aqueous vapour		5107

The calorific power of the mixed gas was therefore, in the foregoing case, 5107 calories per cubic metre, or 574 B.T.U. per cubic foot.

If 4 cubic metres (141 cubic feet) of pure coal gas of 5297 calories be taken after the station meter, and mixed with 1 cubic metre (35·3 cubic feet) of neat water gas of 2600 calories, it will give a calorific power for the resulting mixed gas of 4757 calories per cubic metre, 534 B.T.U. per cubic foot.

Or a gain through self-carburetting, per cubic metre of mixed gas, of 350 calories, or nearly 40 B.T.U. per cubic foot.

Or a gain through self-carburetting, per cubic metre of water gas, of 1750 calories, or 196½ B.T.U. per cubic foot.

The result is therefore the same as if 1 volume of oil-carburetted water gas of 4350 calories per cubic metre, or 487 B.T.U. per cubic foot, had been added to 4 volumes of coal gas of 5297 calories per cubic metre, or 595 B.T.U. per cubic foot.

As regards oil-carburetted water gas, the following figures are available from German towns:—

Calorific Power.		Cost in Holder.	
Calories per Cubic Metre.	B.T.U. per Cubic Foot.	Pfgs. per Cubic Metre.	Pence per 1000 Cubic Feet.
(1) 4250–4550	477–511	5·60	19·04
(2) 4200	472	4·55	15·46

Assuming that 1 cubic metre of oil-carburetted gas of 4350 calories costs 5 pfgs., and 1 cubic metre of blue water gas 2 pfgs., the gain through self-carburetting is in this case equal to 3 pfgs. per cubic metre of water gas, or 10·02d. per 1000 cubic feet. In order to bring 1 cubic metre of blue gas up to 4350 units by means of benzol, 175 grammes are required, which, at the price of 23 marks per 100 kilos., would mean a cost of 4 pfgs., or 13·6d. per 1000 cubic feet.

The results of all the tests made are shown below—

No. of Test.	Date.	Coal.	Water Gas in Mixed Gas.	Gain by Self-Carburetting.	
				Per Cubic Foot of Mixed Gas.	Per Cubic Foot of Water Gas.
	1904.		Per Cent.	B.T.U.	B.T.U.
1	June 29	Ruhr	21·6	39·3	182
2	June 30	,, ...	14·3	25·0	175
3	July 1	,, ...	16·5	30·8	186½
4	July 6	Durham . . .	20·0	39·3	197

These results show remarkable uniformity, and may be termed favourable. If the correct theory of self-carburetting is that by rapidly driving the coal gas from the retort certain valuable hydrocarbons (methane, ethylene, and benzene), are preserved from destruction—then the very long and hot Mariendorf retorts should yield especially good results. From this theory may be also deduced (as, indeed, is proved by the trials of the German Water-Gas Company) that if the flow of gas in the retort is allowed to exceed or to fall below a certain speed, the results will materially deteriorate. The same may be said when the water gas is introduced into the retort for longer than the first two hours. Unfavourable results from this cause were found in the two following tests:—

No. of Test.	Date.	Coal.	Water Gas in Mixed Gas.	Gain by Self-Carburetting.	
				Per Cubic Foot of Mixed Gas.	Per Cubic Foot of Water Gas.
	1904.		Per Cent.	B.T.U.	B.T.U.
5	July 8	70 p. ct. Durham 30 ,, Silesian	21·4	22·8	102
6	July 11	,, ,,	18·4	18·8	102

In the case of test No. 5, a small proportion of the cocks passed 65 volumes of water gas through to 100 volumes of coal gas, a larger number about 12 to 100. In the one case, the rate of flow of the gas was far in excess of the extreme limit of 50 to 100; in the other it was only about half the normal rate of flow. In test No. 6, about one-sixth of water gas passed into retorts which had already been charged for more than two hours, the remaining five-sixths partly into some with a mixture of 30 or 31 to 100, partly into others with one of 11 or 12 to 100. Under these conditions, the gain through self-carburetting decreased materially, though nevertheless remaining considerable.

The above trials, though they included hundreds of calorific power tests, do not, of course, give definite results; and they will be continued later on. For the present, it is sufficient to add that they were conducted with the greatest care by the Engineers of the Imperial Continental Gas Association, with the assistance of Dr. Messerschmitt, of the German Water-Gas Company, Dr. Phil. Barth, of the Berlin-Anhalt-Engineering-Works, and Mr. A. J. van Eyndhoven, the Chemist of the Imperial Continental Gas Association. No special alterations were observed, during the three weeks' trial, in the working of the plant, as regards either the formation of carbon in the retorts, thick tar, or stoppages in ascension-pipes, &c. The presence of water gas in the illuminating gas was not noticeable by the consumers.

A special feature of the "Question Box" at the meeting of the Michigan Gas Association next month will be a "Trouble Box," the object of which, as will be apparent, is to enable members to obtain the help of their colleagues in overcoming the difficulties they encounter in their every-day work. This box will be in charge of Mr. E. F. Lloyd; and each question will be referred to some member for investigation.

INVESTIGATIONS ON THE PENTANE LAMP.

In the Engineering Section, at the recent meeting of the British Association, Mr. CLIFFORD C. PATERSON described as follows some investigations on the 10-candle Harcourt pentane lamp, carried out at the National Physical Laboratory.

The 10-candle pentane lamp designed by Mr. Harcourt is now generally accepted in this country as the standard of illuminating power, and has been adopted, with slight alterations, by the principal gas companies in the United States. In this paper it is proposed to give briefly the results of investigations carried out at the National Physical Laboratory, in order to determine the change in the candle power of the lamp due to variation (1) in barometric pressure and (2) in the quantity of water vapour present in the air. It has been generally admitted that changes occur in the illuminating power due to these causes, but that in the case of comparisons between the pentane standard and gas-lights, the latter will probably be affected to the same extent as the standard lamp—rendering any correction unnecessary. This is by no means the case when photometric comparisons are made between the pentane standard and a source of light unaffected by atmospheric conditions, as, for instance, an electric glow-lamp; and errors of the order of 5 per cent. may be introduced into candle-power measurements if corrections are not made for the hygrometric and barometric conditions existing at the time.

In order to ascertain the amount of variation, photometric comparisons were made against two large bulb Fleming-Ediswan electric standard glow lamps. The double-comparison method only was employed, and the electric lamps used to standardize a comparison glow-lamp anew for each experiment; so that it was only necessary to burn the standards for five or ten minutes at a time.

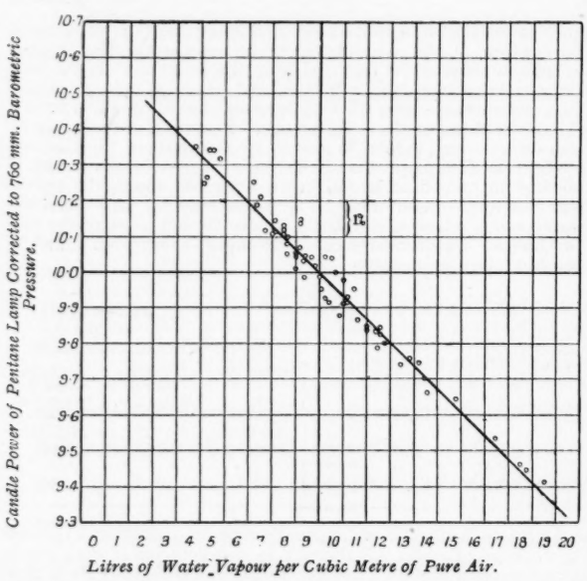


DIAGRAM SHOWING VARIATION IN ILLUMINATING POWER OF THE 10-CANDLE HARCOURT PENTANE LAMP, DUE TO WATER VAPOUR IN THE ATMOSPHERE.

It is found convenient to state humidity volumetrically as the number of litres of water vapour to a cubic metre of pure dry air at the barometric pressure existing at the time; so that if b = reading of barometer in millimetres, e = aqueous, pressure, e_1 = vapour tension of carbon dioxide present in the atmosphere, the litres of water vapour per cubic metre of pure air will be equal to—

$$\frac{e}{b - e - e_1} \times 1000.$$

Upwards of 60 observations have been made on different days over a range of humidity varying from 5 to 20 litres per cubic metre, which are about the limits obtained under ordinary conditions in a well-ventilated photometer-room; 80 per cent of these, when corrected by means of the formula fall within + or 0·5 per cent. of 10-candle power. The barometric pressure in these observations has varied from 739 mm. to 780 mm. of mercury; so that, applying the method of least squares for these two variables, the following formula has been obtained for correcting the candle power of the lamp to the standard atmospheric conditions of 760 mm. of mercury and 10 litres of water vapour per cubic metre of pure dry air—

$$\text{Candle power} = 10 + 0{\cdot}066(10 - \epsilon) - 0{\cdot}008(760 - b),$$

where ϵ is the humidity as explained above, and b the height of the barometer in millimetres.

From this it will be seen that a variation of 1 litre per cubic metre in the moisture causes a variation in candle power of about 0·7 per cent., and that 10 mm. change in barometric pressure brings about an alteration of 0·8 per cent. in the illuminating power of the lamp. The standard humidity of 10 litres per 1000 has been fixed upon as being the mean value for three years found at the Kew Observatory. The figure is also borne out by observations made at the Meteorological Office in Victoria Street, London.

SUPPLY OF COKE-OVEN GAS IN AMERICA.

In the "JOURNAL" for the 12th ult., it was stated that 24 ovens in the new Semet-Solvay plant of the Milwaukee Coke and Gas Company had begun operations, and that the remaining 56 would soon be started. With the completion of the 80 ovens, there will be a surplus of about 3 million cubic feet of gas daily for disposal; and we learn that arrangements are practically complete by which the Milwaukee Gaslight Company will relieve the other of it. The fact is of special importance at the present time, in view of the opening last Wednesday of the works at Royston for the supply of coke-oven gas, an account of which is given elsewhere; and the following particulars, which reached us very opportunely the day after that ceremony from an esteemed correspondent in America, will no doubt be read with interest in connection therewith.

The condensed and scrubbed gas will be delivered from the coke-ovens in the Kinnikinnick Valley to the purifying-house of the Gaslight Company's east-side works, through two miles of mains now almost finished. These works contain four 11 feet carburetted water-gas machines, and will be able to bring up the candle power of the coke-oven gas to any desired point. The Gaslight Company have an exclusive franchise to distribute gas for lighting, fuel, and power; and it is the only outlet for the surplus coke-oven gas.

Neither of the Companies can know exactly how much of the coke-oven gas will be made. The process utilizes coals of various qualities ranging from a good 35 per cent. volatile matter gas coal downwards, aiming first of all to produce a hard, low-sulphur coke for use in iron smelting, and blending various coals to this end, without severe regard for the gas yield. Eighty ovens have been built, with a capacity of 7 tons each, or rather more if higher heats are carried; and the site will permit of readily doubling the plant. Whether or not more ovens will ultimately be erected, or whether only a part of those now standing can be used continuously, will depend absolutely upon the market for coke.

American gas engineers are divided on the outlook for metallurgical coke. The main source is the Pennsylvania fields, where the best gas coal is coked at the mines in ovens, many of which waste all the bye-products. The price of this coke has been steadily falling, and the amount in storage steadily growing the last few years. On the other hand, a considerable number of bye-products installations have been recently set up in industrial centres, on the theory that greater economy results from transporting the coal to them, carbonizing it in a way to gain the best earning from the residuals, and selling the coke on the spot. The growing faith in this policy has been shaken of late.

This style of combination, where the old-established gas company takes and sells the surplus oven gas, is not uncommon. Detroit, a city similar in size and other respects to Milwaukee, has so operated for the last three years; the Solvay Process Company turning over to the Detroit City Gas Company a part of the gas from their 120 ovens. In some ways the oven system of carbonization has its advantages over the retort system. The units are larger, simplifying the operation; the plant is less expensive; and the yield of residuals is said to be markedly greater. The gas is produced at comparatively low temperatures, and so does not give rise to naphthalene troubles. On the contrary, if it is wished to sell any part of the coke for domestic use, it is found that the protracted carbonizing period (as high as 24 hours) which is essential to produce a low-sulphur coke has made the product too hard for satisfactory use in an ordinary house furnace or cooking-stove. The ovens are fired by a part of the gas distilled from the coal undergoing carbonization (the last or poorest gas); and in winter, when the greatest supply of surplus gas should be available, it is actually at its minimum, because of the large portion required as fuel for the ovens, which are exposed to the high, cold winds, and unprotected from heavy falls of snow. The panic that seized old line gasmen two or three years ago, when it began to be generally believed that the oven system would displace the retort system, is now nearly forgotten.

The copying of drawings and tracings being part of the office work of most engineers and managers of gas-works, their attention may be called to a little book entitled "Ferric and Heliographic Processes," by Mr. G. E. Brown, F.I.C., a second edition of which has just been published by Messrs. Dawbarn and Ward, Limited. A new feature of the book is the account of the plant for printing copies in blue and other papers; and the chapters on "Kallitype" embody the recent advances in this process. Following the text, which has been largely re-written and brought up to date, is a bibliography of the subject; and there is a useful index.

VENTILATION OF RETORT-HOUSES.

A paper dealing with the above subject was presented by Mr. ALFRED LOTZ, of Chicago, at the last meeting of the Western Gas Association; and it came up for discussion at the Gas Congress subsequently held at the St. Louis Exhibition. The following are some extracts from the paper, with the principal points brought out in the discussion.

The problem of ventilating a building used for any specific purpose is rather more complicated than would appear on the surface. It is easy enough for an engineer to say that an air change of once every minute or two minutes will give the proper results, but that is not all that must be taken into consideration. For example, suppose you have a large kitchen with ranges which are generating considerable steam, there is really no way to figure out a ventilating plant on any prescribed formula; and it resolves itself into a matter of experience only as to how often the air should be changed to give the proper results.

Every gas-works manager and superintendent is only too familiar with the very objectionable features connected with the old-time method of quenching hot coke from the retorts, the delay in handling the coke when quenched, the deterioration of iron-work in the building, and the danger to the working force, as well as its inefficiency, due to the accumulation of steam and gases arising from the coke, and the inability to get rid of it in anything like a reasonable time.

Many schemes have been resorted to in order to overcome this difficulty, but none of the older forms have given anything like desirable results. In retort-houses where half-depth benches are used, and the coke is drawn directly on to the charging-floor and quenched, the natural ventilation due to a high roof is depended upon; and if the external atmospheric conditions are favourable, the results may be more or less satisfactory. But where either half-depth or full-depth benches are used in connection with a separate charging-floor, the coke being deposited underneath this floor and quenched there, the ventilation becomes a very serious matter. I have been in some plants where this room was connected with large stacks running up through the charging-floor and the roof above. Another plant had a trough suspended at the ceiling, and this trough was connected with a large steel-plate fan—the trough, of course, having a certain number of openings to act as intakes for the system; while another had a large disc ventilating fan placed at one end of the retort-house underneath the charging-floor. This fan was 6 feet in diameter, and when running at 300 revolutions per minute was handling 63,000 cubic feet of air per minute, requiring an 8-horse power engine capacity to drive it. The latter was the best arrangement, so far as results were concerned; and it may be interesting to give it a little closer attention.

The fan was installed in the retort-house of the Minneapolis Gas Company. There were 22 benches of nines; the entire stack being 11 benches long and 2 benches deep, placed back to back. The room below the charging-floor was 180 feet long, 65 feet wide, and 11 feet high—making a total of about 130,000 cubic feet. Allowing for the space occupied by the stack, which amounted to 33,000 cubic feet, we have left 97,000 cubic feet. The fan capacity, as already stated, was 63,000 cubic feet per minute. This would give an air change of once in every 1½ minutes, approximately. The natural conclusion would be that the house ought to be perfectly free from steam and gases 1½ minutes after the coke quenching was completed. The actual results, however, were far from this; the reason being that there were always more or less windows and doors open near the fan, and the air would rush in from these, supplying the fan with all the air it could handle, and short-circuiting that part of the room which really needed the ventilation most. The only possible way to have accomplished a complete removal of the steam would have been to have the air replacing that which was exhausted by the fan enter at the farthest point from the fan, and keep all the windows and doors, as well as all openings between rooms underneath and above the charging-floor, closed, which, of course, is not to be thought of in a retort-house.

I will now take up a ventilating system recently devised by a firm of ventilating engineers of Detroit (Mich.), which has been proved to exceed all expectations of the engineers and of the gas companies in whose plants it has been installed. About October or November of last year, the Detroit Gas Company laid before the engineers in question the proposition of ventilating their retort-house, and the problem was looked into very carefully. At about the same time they also received a request from Mr. Douglas, the Manager of the Ann Arbor Gas Company, to look into the same subject as pertaining to their plant. There were many questions which presented themselves; and I dare say, with all the experience they have had along other lines of manufacturing plants, the proposition of ventilating a gas-retort house successfully was an experiment with them as well as with the Gas Company. There are two systems installed—one in the Detroit plant and the other in the Ann Arbor plant. In actual principle, the plants are the same, though in construction they differ very materially; and I will give only a description of the one at Detroit, which was finally decided upon as the standard of design and construction for all future plants.

Underneath the charging-floor, and running the full length of the stack, is suspended a hopper, made of reinforced concrete and heavy structural and sheet steel. This hopper is suspended from the I-beams forming part of the construction of the charging-floor. About 6 feet of head-room is left between the bottom of the hopper and the floor of the coke-discharging room. The front of this hopper is provided with heavy sheet-steel doors, one for each set of retorts—a set constituting the retorts in the same vertical plane. For each door is furnished a water-spray for quenching the coke. The end farthest from the ventilating apparatus is sufficiently closed not to allow the coke from the last set of retorts to fall out of the hopper. At the other end of the hopper, a large heavy sheet-steel flue connects with the inlet of the ventilating-fan. From the discharge end of the fan, a steel flue runs through the outside wall of the retort-house, which conducts into the outside atmosphere all steam and gases arising from the process of quenching the coke.

The fan is driven either by a direct-connected steam-engine or an electric motor. The fan and engine can be placed in any convenient corner and out of the way. In the Detroit plant, it is placed underneath the charging-floor; whereas in the Ann Arbor and other plants it is placed in one corner upon it.

The question will naturally occur: "How do you know how much steam and gas arise from the process of quenching hot coke with water, and how would the size of the apparatus vary with the different sizes of retort-houses?" This is a very simple matter when thoroughly understood, and leaves absolutely no room for guess-work, but resolves itself into a definite train of calculation which may be roughly summed up as follows: We will take a stack consisting of a series of full-depth benches of nines. The maximum quantity of coke that will be drawn at any one time will be that taken from three retorts of one bench multiplied by the number of benches. Knowing the amount of coal charged into each retort, we have the total bulk discharged. As the time consumed in quenching is very short compared with the time elapsing between the drawings, the latter does not come into the calculation. Coke leaves the retort at a bright cherry-red heat, which is about 1800° Fahr.; and we know, from definite engineering data, that it takes a certain number of heat units to raise a pound of coal, or its equivalent in coke, to that temperature, and that this coke when cooling will give off the same heat as it has absorbed. Taking the specific heat of coke at that temperature, we can work out how much water is necessary to absorb the heat given off by the coke. From this we can reckon the number of cubic feet of steam and gases resulting; and allowing a coefficient deduced from experience for the additional air necessary to absorb the moisture, we have the total number of cubic feet of gases to be handled by the fan. The vacuum at which this fan must work is dependent entirely on local conditions, and varies from 1·5 inches to 3 inches water gauge, and must be figured to conform with the individual lay-out. The power required by the fan is dependent on the total number of cubic feet of gases handled per minute, as well as on the vacuum necessary; and it will vary from 6 to 20 horse power.

The operation of the system is as follows: Just before the coke is drawn, the fan is started, and a current of air rushes through the hopper. The coke is then drawn, and allowed to fall into the bottom of the hopper. Just before drawing the coke, however, the water is turned into the spray pipes. The quenching starts the instant the hot coke and water meet; and the steam and gases arising in consequence are caught by the current of air in the hopper, and taken out of the building through the fan. After the coke has been thoroughly cooled, the water is turned off, and the coke is allowed to remain in the hopper for about 5 or 10 minutes while the fan is still running. The air going through the hopper is perfectly dry, and permeates through every particle of coke; thus absorbing all the water left, and thoroughly drying out the coke, making it marketable the minute it leaves the hopper—a feature which has never before been accomplished.

Another valuable feature of this system is the fact that it can be used advantageously in connection with an automatic conveyor plant. After the coke is quenched and dried in the hopper, it is drawn out and allowed to fall into the conveyor; thus obviating the necessity of quenching the coke while in the conveyor, and thereby causing an undue deterioration of the plant. If a conveyor were handling dry coke instead of being subjected to the intense heat of the coke as it leaves the retort, and then to the destructive and corrosive action of the hot steam and gases due to the quenching, its life would be greatly prolonged, its depreciation materially reduced, and a great saving for the gas company would result.

In concluding my remarks on this subject, I will say that in retort-houses where the coke is not discharged through the charging-floor, but is deposited directly on it, and quenched there by means of a hose or by throwing water upon it, the vapours cannot be properly confined, unless it be by a complicated system of portable hoods. The best way in which to treat the subject under these circumstances is to construct a series of hoods directly in front of the benches, and just above the highest charging-door, and connect these hoods to one common flue—this in turn to be connected with a fan designed to handle a large volume of air at low resistance. The suction of this fan will have a tendency to concentrate the steam and gases, as well as the smoke when charging, and discharge them outside the retort-house; at the same time constantly changing the air in front of the benches, and thereby producing at least a fair ventilation.

In the course of the discussion following the paper,

Mr. Earnshaw stated that in Philadelphia they had tried a number of methods for ventilating the retort-houses, having been much troubled with the steam and gases in the lower floor; but nothing they had tried had been successful. They had had ventilating fans with pre-heated air—a system installed by the Sturtevant Company; but it made very little impression. The air-ducts leading to the fan were made of galvanized iron, and lasted only a short time under the influence of the steam and sulphur vapours from the coke. In the course of a year, they all fell down of themselves. They then tried a system of pipes leading from the lower floor along the front of the benches, and extending above the hydraulic main—one pipe between each two benches—expecting that the heat of the benches would furnish a natural draught in the pipes, and help to clear away the steam from the lower floor. A great deal of steam seemed to come up through the pipes; but they did not miss it downstairs, and this seemed to be the trouble. The quantity of steam, where they were drawing coke fast with machines, was so enormous that nothing they had tried had been able to deal with it. In the house he was speaking of, they had 36 benches of nines, 18 on a side, and they drew them pretty fast—42 retorts in about 20 minutes—which made a great deal of steam to be dealt with.

The next speaker was Mr. Searle, who was not particularly impressed with the system described by Mr. Lotz, which seemed to him to "produce an ideal condition for an explosion sooner or later." He said that with the large duct employed in handling gases and steam, and with the steam in contact with red-hot coke, there was the chance that some accident would happen to the blowing plant, and then there would be a terrific blast-pipe accident. Another feature that would have to be taken care of was the material used. He thought an expensive construction, such as glazed tiles and channels, would be cheapest in the long run. He had been studying the problem of ventilating retort-houses in which there were ten benches of nines; and the simplest method which suggested itself, and one which became automatic, was a stack 16 feet square and about 50 feet high. As the temperature of the basement rose, the stack drew faster. They calculated that it emptied the basement three times a minute. They found they had to close the side windows of the basement, and take all the air at the extreme end of the building, through the basement, to the stack at the other end. A newspaper held suspended at the open end of the cellar would float the entire length of it in the draught, and ascend the stack; and as the temperature rose, the travel was much more rapid. This absolutely cleared the basement, and gave as much satisfaction as could be wished. The construction of the stack would have cost $800 if built simply as a stack; but they were fortunately able to use some walls already standing. He did not think the average coal-gas men appreciated the importance of the economy of retort-house ventilation. If the house was not ventilated, they had economy in labour for a few hours in the early part of the day, and then, as the men became semi-asphyxiated, they did not get the maximum efficiency out of them from noon till somewhere about six o'clock.

Mr. H. L. Doherty, of New York, made a few remarks on the subject under discussion. He reminded the members of the existence of the American Society of Heating and Ventilating Engineers, and said that while their work had been primarily in the nature of ventilating dwellings, assembly halls, and similar places, they attempted to cover the broad ground of heating and ventilating. With respect to his own experience, he found that where there was a small quantity of air to deal with, they could afford to do it by mechanical means more economically than by natural draught; but where there was a large volume, they generally found that the interest and depreciation on the stack were very much less than the operating expenses and the interest and depreciation on the fans. The question of ventilating retort-houses was a very important as well as an interesting one, and there was one point he would make which might prove of assistance to some engineers who had the problem to solve. Steam had a gravity of about one-half that of air. It was sometimes possible to use their heat in the smoke-stack to produce steam, or if they had a large surplus of waste steam to turn it into the stack, and get better effect by having a greater unbalancing between hot and cold columns of air.

At this point, Mr. Earnshaw interposed with a question to Mr. Searle, in regard to the way in which he got the steam to go up the stack—how it became sufficiently heated to cause an ascending current. He said they found in Philadelphia, when experimenting with the small stacks arranged between the benches, that it was difficult to get them sufficiently hot to cause a draught. At first they put up some iron stacks, which drew very well, but in order to avoid their corrosion, they experimented with clay stacks made of tiles, fitted together, the same size as the iron stacks. Though they were very close to the benches, they found they were not a success, because the steam did not become sufficiently hot to cause a draught, and they would not clear the cellar so well as the iron stacks, which transmitted the heat from the benches and created a good current of air.

Mr. Searle, in reply, said he presumed part of their good fortune was due to the enormous size of the stack—16 feet square. They used part of their exhaust steam in the stack; and this always kept it at a certain high temperature. The climate was such that the air in summer was never below 90° Fahr.; and the average temperature of the cellar before ventilating was about 130° Fahr. This was caused by all the coke being pulled through the shoots, and the retort-house basement filled, and the coke quenched in a pile as it accumulated in the basement acting, in a sense, as a hopper for the hot coke from the retort, and the temperature would rise rapidly. Referring to the blast-pressure system, this was simply a series of nozzles so arranged as to play on the backs of the negroes with air taken from the retort-house at the same temperature as the air on the operating floor, to keep the men from getting cold, and at the same time evaporating the moisture on their bodies to keep the temperature down. It had little other effect. It was simply a No. 5 Sturtevant fan, and could not handle much more than 500,000 cubic feet of air per hour at the rate it was delivered to the pipes. It would have required something like 100,000 cubic feet per minute to ventilate the building. They removed every window in the retort-house, and also the window-frames, in order to get some larger openings. They lifted off a portion of the roof, and took out everything possible, so as to make as large openings in the retort-house as they could get. All the house openings were increased in size; practically bringing the operating floor into the external air.

Mr. Lotz, in replying upon the discussion, dealt first with Mr. Searle's remark in regard to the danger of an explosion in connection with the system described in the paper. He said the temperature of the coke and steam, when the steam was formed, was below the ignition point of the gases in the hopper. Again, it took a certain amount of time to quench the coke. In no retort-house was all the water thrown on all the coke at once. If it were, one would need an exceedingly large apparatus to take care of it; but the fact was that the quenching was prolonged—say, over a period of five minutes. Assuming this length of time as a standard, they could divide the amount of the total gases generated by quenching the coke by five minutes, which would materially cut down the total handled by the fan. At no time was there so much steam formed under these circumstances as even to give a steam explosion; and the current of air going through the hopper was all that was necessary to take care of it. The air went through at the rate of pretty nearly half-a-mile a minute; gathering up the steam and gases as fast as they were formed. As far as the steam going up through the cracks of the charging-floor was concerned, it was a practical impossibility, because the hopper was entirely closed, and all the suction it got was from one end and through the cracks right above it; so that the tendency was to suck everything down and into it, instead of allowing it to escape.

Sandell's Gas and Water Companies' Account Books.—We have received from Mr. Charles Sandell specimen sheets of his new Water Companies' Expenditure Journal, and an Expenditure Journal for water and gas undertakings combined, with a short illustration of the working of the latter. The idea of the book is to obviate the necessity of having so many columns for analyzing purposes; and this is done by the simple method of filling in the gas figures in black and the water figures in red.

The Competition for the New Gas-Works for Bordeaux.—With reference to the notification which appeared in the "JOURNAL" for the 26th ult. in regard to the competitive schemes invited for the construction of the above-named works, the designs for which were to be sent in by the 31st inst., we learn from M. Avril, the Engineer and Manager of the Bordeaux Gas Company, that, owing to the delay which occurred in announcing the matter in certain publications, thus curtailing the time at the disposal of intending competitors, it has been decided to allow them till the 15th prox. for the delivery of the plans and specifications.

The Prices of "New" Inverted Gas-Burners.—The New Inverted Incandescent Gas-Lamp Company, of No. 23, Farringdon Avenue, E.C., have extended the range of their burners, so as to give customers a greater choice both in regard to style and price. In large sized burners, they have added another which will be known as No. 2. It is made in polished brass or steel bronze; and, for the price charged, the Company are giving an excellent article. The popularity of the "Bijou" burner has also led them to comply with the demand for a cheaper form, and hence the new No. 3 "Bijou." The necessary globes and mantles are also being supplied at prices which will assist in making this type of burner more popular still. Simultaneously with these new introductions, the trade discounts have also been increased. The Company's new catalogue is worth examination.

Gas from Pulverized Combustibles.—M. Marconnel has taken out a French patent for a process and apparatus for the production of gas. A mixture of air and finely-pulverized combustible is aspirated in regulated quantities by each suction of the motor (or other apparatus to be supplied with the gas) into a shoot, wherein the fuel is burnt during its downward passage. From an ashbox at the foot of the shoot, the gas produced is led off to the motor, a portion being withdrawn to feed the burners in the combustion shoot. The device for producing the mixture of air and combustible consists of a vertical pipe having a hopper at the top, from which the powdered fuel descends in a continuous stream. The pipe is connected on one side with the combustion shoot, and on the other with an air-supply pipe. At each suction of the motor, the air rushing through the descending stream of fuel carries over a determined quantity into the shoot in the form of a cloud. The excess of fuel which accumulates at the foot of the vertical pipe is from time to time transferred to the hopper.

INTERNAL COMBUSTION ENGINES.

In the Engineering Section, at the recent Meeting of the British Association, this subject received a fair amount of attention. It was mentioned in the opening address of the Hon. CHARLES A. PARSONS, the President of the section, and was dealt with in three of the papers discussed. The President's remarks were as follows.

The first true internal-combustion engine was undoubtedly the cannon; and the use in it of combustible powder for giving energy to the shot is strictly analogous to the use of the explosive mixture of gas or oil and air as at present in use in all internal-combustion engines. Thus the first internal combustion engine depended on the combination of a chemical discovery and a mechanical invention—the invention of gunpowder and the invention of the cannon. In 1680, Huygens proposed to use gunpowder for obtaining motive power in an engine. Papin, in 1690, continued Huygens' experiments, but without any success. These two inventors, instead of following the method of burning the powder under pressure, as in the cannon, adopted, in ignorance of thermodynamic laws, an erroneous course. They exploded a small quantity of gunpowder in a large vessel with escape-valves, which after the explosion caused a partial vacuum to remain in the vessel. This partial vacuum was then used to actuate a piston or engine, and perform useful work. Subsequently, several other inventors worked on the same lines; but all of them failed on account of two causes which are now very evident to us. Firstly, gunpowder was then, as it still is, a very expensive form of fuel, in proportion to the energy liberated on explosion; secondly, the method of burning the powder to cause a vacuum involves the waste of nearly the whole of the available energy; whereas had it been burned under pressure, as in the cannon, a comparatively large percentage of the energy would have been converted into useful work. But even with this alteration, and however perfect the engine had been, the cost of explosives would have debarred its coming into use, except for very special purposes.

We come a century later to the first real gas-engine. Street, in 1794, proposed the use of vapour of turpentine in an engine, on methods closely analogous to those successfully adopted in the Lenoir gas-engine of 80 years later, or 30 years ago. But Street's engine failed from crude and faulty construction. Brown, in 1823, tried Huygens' vacuum method, using fuel to expand air instead of gunpowder; but he also failed, probably on account of the wastefulness of the method. Wright, in 1833, made a really good gas-engine, having many of the essential features of some of the gas-engines of the present day—such as separate gas and water pumps and water-jacketed cylinder and piston. Barnett, in 1839, further improved on Wright's design, and made the greatest advance of any worker in gas-engines. He added the fundamental improvements of compression of the explosive mixture before combustion, and he devised means of lighting the mixture under pressure. His engine conformed closely to the present-day practice as regards fundamental details. No doubt Barnett's engine, so perfect in principle, deserved commercial success. But either his mechanical skill or else his financial resources were inadequate to the task; and the character of the patents would seem to favour this conclusion, both as regards Barnett and other workers at this period.

Up to 1850, the workers were few; but as time went on they gradually increased in numbers. Attention had been attracted to the subject, and men with greater powers and resources appear to have taken the problem in hand. Among these numerous workers came Lenoir, in 1860, who, adopting the inferior type of non-compression engine, made it a commercial success by his superior mechanical skill and resources. Mr. Dugald Clerk tells us: "The proposals of Brown (1823), Wright (1833), Barnett (1838), Barsanti and Matteucci (1857) show gradually increasing knowledge of detail and the difficulties to be overcome—all leading to the first practicable engine in 1866—the Lenoir." This stage of the development being reached, the names of Siemens, Beau de Rochas, Otto, Simon, Dugald Clerk, Priestman, Daimler, Dowson, Mond, and others, appear as inventors who have worked at, and added something to perfect, the internal combustion-engine and its fuel, and who have helped to bring it to its present state of perfection.

The first paper was by Mr. E. DUGALD CLERK, who dealt with the subject of "Flame Temperature in Internal Combustion Motors."

The author began by pointing out that if we had lived in an atmosphere of much greater density, it was probable that the internal-combustion motor would have developed on very different lines from those actually followed. Assuming an atmosphere of double the present density—say, 30 lbs. pressure absolute per square inch instead of 15 lbs., for given flame temperatures—the explosion pressures would have been double, and the non-compression engine of Lenoir would have been much more successful. Perhaps, also, the schemes of the earlier English inventors, such as Brown (1826), to produce a gas-engine using vacuum and condenser like the steam-engine would have been crowned with success. Had we lived in a very dense atmosphere, say of the order of 70 existing atmospheres, there could be little doubt the compression combustion motor would not have appeared at all, because it would not have been really needed. The explosion pressures to be dealt with would have been so great that the necessity would have arisen for reducing pressure instead of increasing it. This was very well shown by some most interesting explosion experiments recently made by Mr. J. Petavel, of Victoria University, with gas and air mixtures previously compressed over 70 atmospheres and then ignited. These mixtures produced pressures of the order of four to five tons per square inch. This fact the speaker illustrated by means of diagrams; and he next proceeded to consider whether in gas-engines of large cylinder capacity reduction of dimensions could not be secured by increasing mean pressures within the cylinders. Enhanced pressure would permit of gas-flame temperature reductions without requiring reduced maximum in mean pressures.

It was proposed by the author to obtain an improvement by adding exhaust products under pressure to increase the weight of charge present, to raise the pressure before compression, and to diminish the flame temperature. This method of exhaust super-compression had, he said, the great advantage over air super-compression that no additional pumping was required. There were certain advantages, however, to be obtained from the use of air super-compression, notwithstanding the addition of a pump; and these advantages had induced the National Gas-Engine Company to build an engine to carry out the fundamental idea of reducing flame temperatures while increasing mean pressures. This engine was intended to indicate 300-horse power when working with producer gas of about 150 B.T.U. per cubic foot. The idea was to keep up mean pressures while keeping down flame temperatures, in order to avoid the well-known liability of heavily loaded gas-engines to overheating and pre-ignition. The engine was at work with a weaker gas. The back end of the cylinder was arranged as a four-cycle motor of normal type. The front end was arranged as an air-pump, and was closed with a cylinder cover, through which a piston-rod passed from a cross-head guide of usual construction. One air-valve was operated at the pump end from the cam shaft. On one back stroke a charge of air was taken into the cylinder, the valve was closed, and on the out-stroke the air charge was compressed into a reservoir forming the clearance space between the piston and the cylinder head. Ports overrun by the piston communicated with this clearance space, which was well water-jacketed; and the pressure caused the air to flow into the cylinder when the charging-stroke was nearly complete. In this way the pressure of the charge was raised to about 7 lbs. per square inch. The pressure in the front reservoir was increased to about 16 lbs. per square inch, but the fall was only sufficient to raise the pressure within the cylinder to about 7 lbs. above that of the atmosphere. The reservoir still contained some air at a little above 7 lbs. pressure; and this was used on the next exhaust stroke to act as a scavenging air charge to displace the exhaust products from the cylinder, and secure that no exhaust remained to form part of the further charge. The engine was thus not only a super-compression engine, but also a scavenging engine. The pump side was arranged to draw air in on one stroke only; the valve opening once in two revolutions. One air charge was sufficient both for the purpose of super-compression and scavenging. Calculation from the diagrams proved clearly that a high mean pressure of upwards of 100 lbs. per square inch was obtained with the very low maximum temperature of 1200° C. The tendency to pre-ignition or overheating was found to be entirely absent; and although no watered piston was employed, the engine ran with perfect certainty at full load, with consecutive ignitions, at 160 revolutions per minute.

The author pointed out that in Great Britain at present there are examples of all the leading internal-combustion motors of the world, large and small. British makers were, he said, occupied in building, among large gas-engines, those of the Cockerill, Oechelhaeuser, Körting, and Westinghouse types; while other English firms, such as Crossley Bros., the National Company, and the Premier Company, were producing large gas-engines of British invention on British lines. Indeed, some of the Continental engines might also be said to be operated on these lines, because both the Körting and the Oechelhaeuser engines were really modifications of the Clerk cycle, invented and operated in this country more than twenty years ago. From this it would be seen that British makers were no longer neglecting—if they could be said ever to have neglected—the large gas-engine problem. So far as small and moderate-sized gas-engines were concerned, British engineers had a very long lead. From information supplied by many English firms, he estimated that there had been manufactured and sold from Britain alone some 100,000 stationary gas-engines; the average capacity being something like 20-horse power. The present output of gas-engines in Britain amounted to at least 200 per week. This included stationary gas and oil motors, but took no account of petrol-motors for cars. So far as these engines were concerned, the British position could not be improved upon; and in the large gas-engines the problem was being seriously attacked.

In conclusion, Mr. Clerk said the question of flame temperature appeared, perhaps, the most important and fundamental at present before engineers engaged in the design of internal combustion motors. It was fitting that this branch of the subject should be considered by the British Association; and assistance

was particularly desirable from any physicists who had interested themselves in temperature measurements, especially high ones. The determination of these flame temperatures was one of great difficulty, and the data available were very incomplete. Certain assumptions had to be made—for example, as to the temperature of the total charge at the moment of filling the cylinder before compression began. He was glad to say that a Committee of the Institution of Civil Engineers had been formed to attack the whole question of the thermo-dynamic standard for these engines; and, among other points, he hoped that this one of flame temperature and its determination would be duly considered. There could be no doubt that in these times, when internal combustion motors were being applied to every purpose of motive power both on land and sea, the scientific problems, which, after all, were fundamental and necessary to rapid progress, required much more serious consideration than had been yet given to them.

The second paper was by Professor HAROLD B. DIXON, who dealt with the subject of "The Specific Heat of Gases at High Temperatures."

After stating that he had been studying the subject for twenty years, the author pointed out that at certain temperatures, which form the practical limit to those attainable in gas-engines, dissociation occurs. In the case of carbonic oxide, this dissociation temperature is relatively low. He described his own method of determining the specific heat of carbonic acid gas at increasing temperatures. He uses a steel bomb of special construction, in conjunction with a calorimeter. With this apparatus he said he had obtained the specific heat of carbonic acid gas up to 400° C., and the figures obtained by him agreed fairly well with those of Joly. Up to this temperature, the specific heat values rise steadily, and dissociation probably occurs about 2000° C.

Professor Dixon next dealt with Bunsen's observations upon the specific heat of steam, and gave his reasons for thinking Bunsen's theory, that the combustion of hydrogen in oxygen takes place in two or more successive steps, is completely wrong. The author's experiments with an alternative method of determining specific heat by observing the alterations in the velocity of sound in the heated gases, were next described. These investigations prove that, by either method of observation, increased values for the specific heat are obtained, both in the case of air and carbonic acid gas, with increased temperature.

A third method of determining specific heats, based upon observation of the rate of explosion in gaseous mixtures at very high temperatures, and the retarding effect of oxygen, nitrogen, and argon upon these velocities, was next described; but Professor Dixon stated that these experiments were still in progress, and that no figures could yet be published.

The third paper was by Professor B. HOPKINSON, the title being "Exhaust Gas Calorimetry."

The author commenced by stating that, so far as he was aware, in all gas-engine tests hitherto made, the indicated work, the heat in the cooling water, and the calorific value of the gas used, were the only quantities which had been directly measured. The balance of heat unaccounted for had been put down to exhaust gases, radiation, and conduction. The special point of the tests to be described was that the exhaust gases were passed through a calorimeter, and so cooled to near atmospheric temperature; the heat rejected by them being measured. In this way, a complete heat account was obtained, in which the only item not directly determined was the loss by conduction and radiation. Professor Hopkinson gave details of the results obtained by the application of this method of testing to a Crossley engine of old pattern, and pointed out that the results were only of experimental value, since the efficiencies of more modern engines of the firm had been much improved. The concluding portion of the paper was devoted to a description of the calorimeter used in carrying out the tests.

The three papers were discussed together. Professor Hopkinson expressed the opinion that Mr. Clerk had not allowed in his engine for the increase of heat losses which would be caused by working, as he proposed, with one-third greater weight of gas in the cylinder; the losses resulting from radiation and conduction under these conditions being necessarily greater than the atmospheric pressure, as in the ordinary engine. Professor Schröter said he thought Mr. Clerk's method of reducing the heat losses was to be preferred to that of Banki, inasmuch as air was employed as the cooling agent. With regard to Professor Hopkinson's paper, he said the method of testing the efficiency of gas-engines described therein had been used in Germany with exceptionally good results. Sir Andrew Nobel, dealing with the subject of Professor Dixon's paper, said his experience in connection with explosives had led him to the conclusion that the specific heats of gases were to some extent influenced by pressure. Lord Kelvin asked whether any experiments had been made with ignition of the combustible gas mixture at more points than one. It was most important to know whether there was any "time lag" in the combustion of the explosive mixtures, and whether, with several points of ignition, the results as regards temperature and pressure were exactly similar to those obtained when only one ignition-point was employed.

In replying to the remarks upon his paper, Mr. Clerk pointed out that the temperatures attained in internal combustion motors never exceeded 2000° C., and that consequently questions of the dissociation of the compound gases did not come within the gas-engine constructor's province. Referring to Professor Dixon's valuable researches, he said they had certainly relieved the minds of gas engineers upon this point; and he looked forward with interest to seeing the results of the Professor's further investigations upon the specific heat of gases at high temperatures. Professor Hopkinson's plan of testing the efficiencies of large gas-engines was undoubtedly an improvement upon the methods at present in use; but it was not new. It had been used in the United States for some months past; and, as Professor Schröter had pointed out, it was also employed in Germany. He might mention, however, that he intended to adopt Professor Hopkinson's design of calorimeter for the gas-engine tests to be made under his supervision by the Committee of the Institution of Civil Engineers upon Standards of Efficiency Measurement for Gas-Engines. As regarded one of Professor Hopkinson's criticisms upon the improvements he had introduced in gas-engine design, he thought that this was based upon a misunderstanding. The kinetic energy of the gases in the new type of engine would not be nearly so great as Professor Hopkinson had imagined. Some stratification of the gases contained in the cylinder undoubtedly occurred, and was, no doubt, sufficiently great to give a higher rate of explosion than that represented by the composition of the gas mixture; but it was not so marked as Professor Hopkinson surmised. Professor Hopkinson then replied to the criticisms passed by Mr. Clerk upon his views respecting the very high kinetic energy of the gases in gas-engine cylinders during and after explosion, and quoted the experimental results obtained both by Sir Andrew Nobel and Professor Dixon in support of his theory. Professor Dixon replied to Lord Kelvin's question as to the existence of a "time lag" in explosion-wave phenomena; and, by giving a detailed account of his methods of observation, he showed that it was quite possible to distinguish between the preliminary ignition flame-wave, which travelled comparatively slowly through the gas mixture, and the true explosion flame-wave, which was much more rapid and striking in its progress. He added that the study of the photographic records of these explosion-wave phenomena undoubtedly proved that an explosion wave does not signify complete combustion of the gases; for these waves can be made to return through the unburnt gases remaining in the tube.

REGISTER OF PATENTS.

Travelling Cranes for Gas-Purifiers.—Hovey, A. C., North Shields. No. 18,281; Aug. 24, 1903.

This invention relates to travelling cranes for gas-purifiers, and was referred to by the patentee in the paper which he contributed to the North of England Gas Managers' Association last year—see "JOURNAL," Vol. LXXXIV., p. 33.

At present, he remarks, travelling cranes used for this purpose when of the girder type are mounted upon a superstructure which necessitates the purifier-house being of considerable height compared with the height of the purifier above the ground level. This height was necessary with the construction and arrangement of lifting gear hitherto employed; but he proposes to provide a crane which can be placed close above the tops of the purifiers without the necessity of any superstructure or extra foundations for carrying the crane, and with the minimum head room, and having lifting gear so arranged that the covers are raised and lowered perfectly level, and swinging of the covers when suspended is avoided.

Fig. 1 (p. 611) is a plan, and fig. 2 a section of the arrangement proposed. Fig. 3 is an enlarged elevation (partly in section) of the winch device for operating the lifting chains.

The purifiers A extend in a double row of any suitable length. B is the crane body or platform, disposed a short distance above the purifier covers. It runs at its ends upon rails carried on brackets fixed to the side of the purifiers. The crane may also be partially supported by wheels mounted on a platform C running between the two lines of purifier covers. The lifting gear consists of a winch device comprising a suitable pedestal or standard D disposed on the platform or crane, and carrying gear—such as bevel wheels E—operated by side handles and serving to raise and lower a screw spindle or rod F, which operates a chain G passing over a pulley H beneath, so as to rotate thereby two shafts I and J—one disposed on each side of the platform and carrying pulleys, two on each shaft respectively, and so spaced apart as to come directly above four points (such as K) from which the cover is to be suspended. By this means the lifting chains M are brought more or less horizontally on the crane under the platform to points directly above the points where they are to be attached to the cover, so that the crane body and platform need only be a sufficient distance above the purifier covers to allow of the necessary lift and clearance, and the short length of chain required to project below the platform prevents any swinging of the covers, and ensures them being brought to the required position for replacement with greater ease.

In the arrangement of the operating chains shown for the two shafts, one shaft I is operated by the chain G from the pedestal; the operating shaft carrying two pulleys at its opposite end, and also two other pulleys O. The former have the chain M fixed to them and depend

Fig. 1.

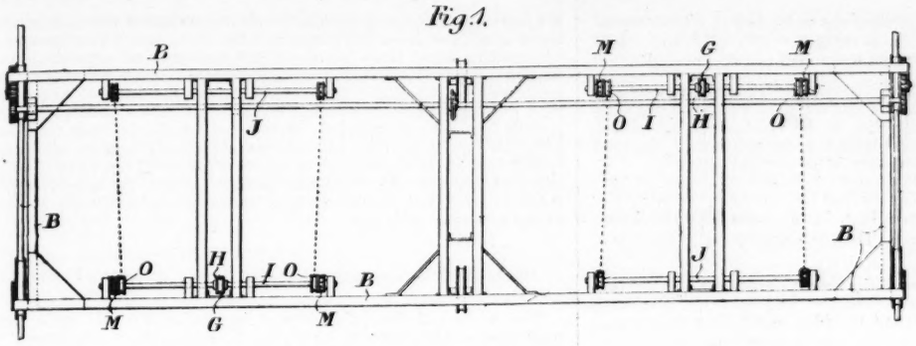


Fig. 2.

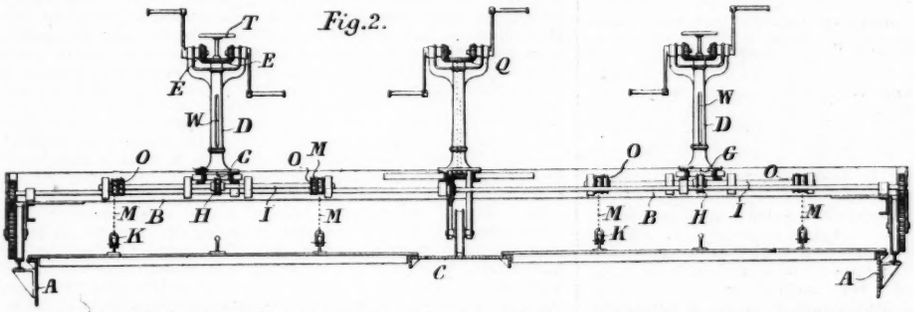
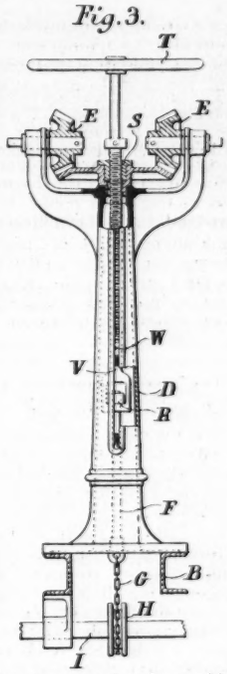


Fig. 3.



or engagement with the point of attachment K to the cover below; while chains are attached to the adjacent pulley O and passed across the crane and over the pulleys on the other shaft J, so as to depend from them to the other two points of attachment K on the cover below. The pulleys on the shafts are in duplicate at each end of the shafts I and J; and so the rotation of the operated shaft I will effect the raising of the chains at the four points simultaneously. The crane is travelled by suitable hand gear Q connected by gears and shafts suitably arranged to the wheels on which the crane travels.

A quick lowering device is also shown, consisting of an arrangement in the pedestal D of a swivelling joint R between the suspending bar F and a screwed portion of it, operated by the bevel gear E through the medium of a nut S. The screwed spindle is extended upward and fitted with a hand wheel T adapted to rotate it. A cottar V is provided, adapted to be inserted through the spindle F to prevent its rotation during operation by the bevel wheel raising gear. The cottar V in the screwed part is withdrawn when the quick lowering gear is to be used, so as to allow the rotation of the spindle in the nuts S by the hand-wheel T during the lowering operation, which can thus be performed more quickly than through the gear wheels E. A second cottar or projection is preferably provided on the lower portion of the shaft F to prevent its rotation during either operation. Both cottars may conveniently slide in a slot such as W formed in the pedestal.

Gasification of Coal in the Production of Gas.—Carpenter, C. C., of Old Kent Road, S.E. No. 14,718; June 30, 1904.

This invention consists of the combination of a vertical gas-retort (preferably tapered) with a horizontal retort or chamber from which the coke or other residual may be readily discharged—the discharge being effected by a specially constructed ram or pusher.

Figs. 1 and 2 (below) are sectional elevations of the combined retort, showing the pusher in two different positions. Fig. 3 is a plan of the arrangement. Fig. 4 illustrates the combination of several vertical retorts with a single horizontal retort or chamber.

A is the vertical retort, provided at its upper extremity with a hopper or door for the admission of the material to be carbonized—effected by a "slot-pouch" arrangement or in any other convenient manner. C is an outlet for the generated gas. The lower part of the vertical retort opens into the horizontal chamber B.

When starting the plant, after the retort has been heated, it is filled with coke or breeze through the feed opening at the top. This falls on to the bottom of the horizontal chamber, forming a conical pile, which supports the superincumbent weight of the material in the vertical retort. The length of the chamber B is so arranged that the coke does not reach the mouthpiece lids. When the retort has arrived at its proper temperature, the charge of coal is admitted through the feeding opening at the top, and gas production begins. The residue (from which all volatile matter has been distilled) is discharged by opening the doors of the horizontal chamber and introducing the pusher E by one door and pushing the residue out at the other. The pusher has a cutter D attached to it to cut through the pile of coke at or about the intersection of the vertical retort and the horizontal chamber.

In order to prevent the carbonized material falling behind the pusher-head during this operation, a shield F is provided, of sufficient length

Fig. 1.

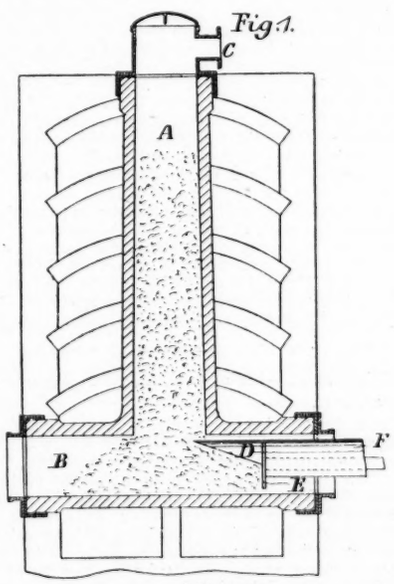


Fig. 2.

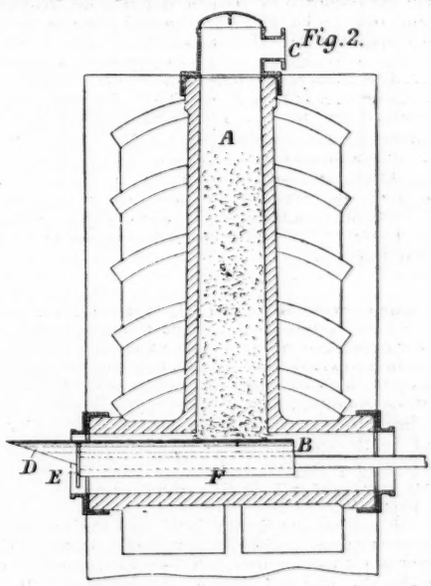


Fig. 3.

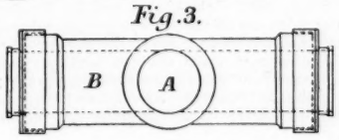
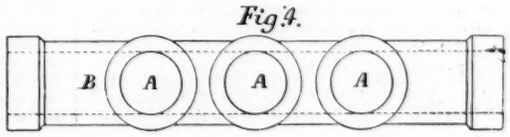


Fig. 4.



to sustain the weight of the contents of the retort during the movement of the pusher for the discharge of the spent material (see fig. 2). This shield is attached to the pusher-head and to the pusher-bar in any convenient manner.

The production of gas is facilitated by admitting steam into the lower chamber at either end. The effect of this is "to sweep out all the volatile matter remaining in the interstices of the residual matter, as well as in some measure to produce gas by the decomposition of the solid carbon." The gasification takes place in the vertical retort.

Gas-Stoves and Water-Heaters.—Rigg, J., of Queen Victoria Street, and Spencer, S., of Great Saint Thomas Apostle, E.C. No. 4767; Feb. 26, 1904.

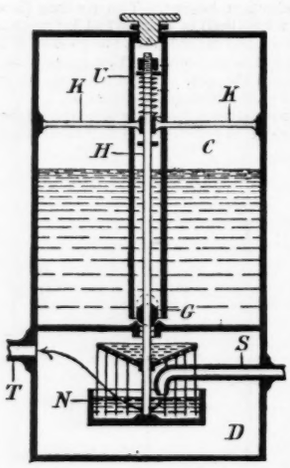
This stove—for heating rooms, diffusing vapour in same (more particularly for medical use, for asthmatical and bronchial patients), heating water within the stove, and warming and boiling for cooking purposes—consists of an outer vertical casing, preferably of cast iron, within which, at suitable places, having regard to the section of the stove, stops or guides are made. Within the casing is a water-tank, maintained centrally in the outer casing by these stops or guides, which thus form a jacket around the tank. The tank is supported by brackets cast within the outer casing, and at a height sufficient to permit of heat being applied by a suitable gas-burner. Provision is also made for the admission of air to the source of heat. To the plate with which the stove and tank or boiler is covered is attached a fume-tube, to be led to a chimney or to the outer atmosphere as may be most convenient; and the fumes, having circulated around the tank or boiler, pass away by this tube. There is also attached, as near as may be to the top of the tank or boiler, a steam-pipe, which, passing through the jacket by the intervention of a three-way cock, permits of the steam being discharged either into the fume tube, and thence to the chimney, or into the room. In the centre of the stove covering plate is an orifice larger than, and corresponding with the form of, the top of the water tank or boiler; and fitting closely upon it is placed a removable cover with a handle. Through the orifice water is replenished when required. A connecting pipe and "draw-off" tap enables hot water to be drawn from a point near the bottom of the boiler.

Condensing and Cooling Gases, Vapours, and Liquids.—Browne, A. F., and Chandler, D., of Vauxhall, S.E. No. 5485; March 5, 1904.

This invention relating to the condensing and cooling of gases, vapours, and liquids—based upon the principle of evaporating water by means of the heat present in, and to be removed from, the bodies which are to be cooled and condensed—was fully described and illustrated in the "JOURNAL" last week, pp. 522 and 530.

Carburetting Apparatus.—Glinicke, F., and Tresenreuter, G., of Berlin. No. 7906; April 5, 1904.

Carburetting appliances hitherto used have, say the patentees, the drawback that the enrichment of gas by means of liquid hydrocarbons is not sufficiently uniform, so that the quality of carburetted gas used for lighting and other purposes varies — sometimes giving a good lighting effect, and sometimes a bad or indifferent result. The remedy is "an automatically and uniformly acting carburettor;" and the present invention is designed to provide such an apparatus.



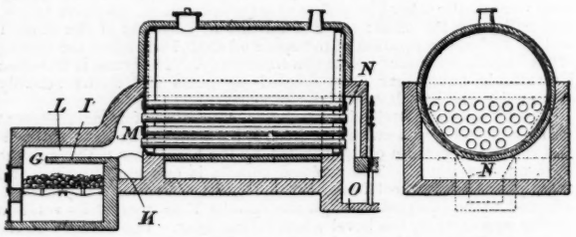
It consists of a closed air-tight cylinder divided by a horizontal partition into an upper hydrocarbon chamber C and a lower carburetting chamber D. The partition is provided in the centre with a boss having a hole formed in it; and upon this boss is formed a seat for a ball valve G. A regulating rod H passes through the valve, and is secured to it. In the chamber C, the rod is guided in a sleeve or boss secured to radial ribs K attached to the cylindrical wall of the vessel. A spring is placed over the rod in such a manner that it presses against a nut screwed to the end of the rod, and thus normally maintaining it sufficiently high to cause the valve to be lifted off its seat. To the lower end of the rod within the carburetting chamber is secured a tray or receptacle N, and, over it, a perforated conical funnel, into the wall of which are inserted a number of wicks depending into the tray. A gas-pipe S, having its end bent over, is introduced into the chamber D, its end terminating in a nozzle in such manner that the end projects into the tray N. An exit pipe T for the carburetted gas also opens into the chamber D.

In order to fill the chamber C with liquid hydrocarbon, the screw stopper at the top is removed, and the liquid poured into the tube U. As the latter is open at the bottom, the liquid rises to the same level in the chamber C. The stopper being replaced, the liquid flows from the chamber C, past the valve G, into the perforated tunnel below, and thence into the tray N. As the latter becomes filled, its weight, together with that of the regulating rod H and the connected parts, become heavier than the spring can maintain, and the rod is thus drawn downwards, and the valve G closed against its seat, so that the opening is closed, and no more liquid can pass from the chamber C into the Chamber D. The gas to be carburetted is admitted through the pipe S, and comes into contact with the surface of the carburetting liquid contained in the tray N and with the wicks, which have drawn the carburetting liquid from the tray N and are saturated with it, so that the gas becomes "thoroughly and uniformly" impregnated with the evaporating carburetted liquid before it leaves the vessel D at the exit pipe T. After a certain time has elapsed, the carburetted liquid in the tray N will have evaporated; and, consequently, the tray, together with the regulating rod, will become sufficiently light to allow the spring to raise the regulating rod again—thus lifting the valve G off its seat and opening the discharge opening. Then the tray N again becomes filled, and the valve closes, and so on automatically as long as the apparatus is in use.

Distilling Coal Tar.—Weyl, C., of Mannheim, Germany. No. 12,122; May 27, 1904.

This method of distillation consists in treating the coal tar in large quantities in apparatus in which the heating surface is arranged as groups of tubes in the interior of the apparatus in such a way that they are entirely surrounded by tar up to the end of the distillation. The distillation can thus proceed without danger of the tar coking and the apparatus burning at a very high vacuum, or at an almost perfect vacuum. The boiling point of the boiling tar at the conclusion of the distillation does not exceed a temperature of from 270° to 280° Celsius taken in the liquid; while the distillation is said to proceed more rapidly than hitherto. In consequence of these lower temperatures, there is very little decomposition either on the walls of the apparatus or in the interior of the boiling liquid, so as to cause a separation of hydrocarbon and diminish the binding properties of the coal-tar pitch and lower its commercial value.

An ordinary horizontal cylindrical boiler with numerous drawn small heating tubes has, the patentee points out, been found to be a most suitable apparatus for carrying out this method of distilling large quantities of tar in a very short time, as (compared with the tar-stills hitherto employed with a similar contents) a much larger quantity of tar may be treated in the same time, or the same quantity of tar in a shorter time, in the heating tube boiler than in the ordinary tar-stills of similar contents.



The apparatus (which is provided with internal heating) is shown in longitudinal and cross section. It consists of a cylindrical boiler of wrought iron with small heating tubes drawn or rolled into the ends. The boiler is mounted at the front and the rear up to the middle on the end walls of a rectangular masonry chamber, the side walls of which also extend up to the middle of the boiler shell. The still exposed places of the boiler are protected against cooling or loss of heat by a coating of insulating material. A furnace G, with a flat grate, is provided in front of the wall of the apparatus. Over this grate a fire-brick arch I is provided, which partially covers it from the rear and forms, with the raised fire-bridge K, a smoke-consuming vaporizing chamber; the furnace gases being carried backwards beneath the incandescent arch over the grate and perfectly consumed, then through a passage L to a distribution chamber M and through the heating tubes to the outlet chamber N, and thence to a flue O and the chimney.

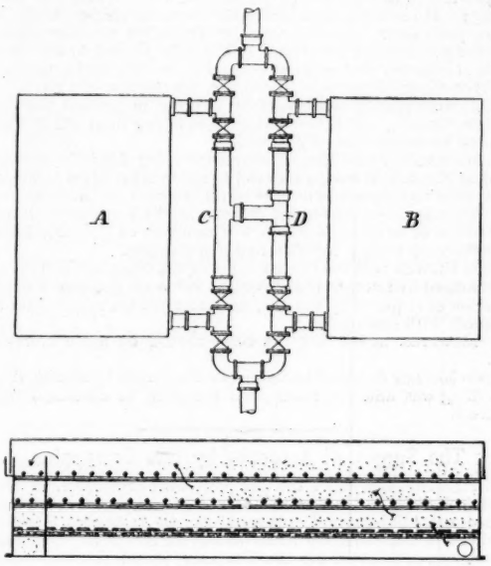
Owing to the circumstance that the heating of the apparatus merely takes place in its interior by means of a series of tubes which are always surrounded by tar, "so that the tar is caused to boil vigorously and undergoes an energetic circulation," the formation of coke on the numerous heating tubes, and also on the walls of the shell of the distillation apparatus which is not heated, is prevented. Further, the transmission of heat through the thin heating tubes which never coke up is extremely favourable—many times better than the transmission of heat through the walls of the tar-stills hitherto employed. A principal advantage in the use of this horizontal heating tube boiler consists, however, in the possibility of using very high vacuum, which diminishes the boiling point of the boiling tar towards the conclusion of the distillation to a temperature of from 270° to 280° Celsius taken in the liquid, and thus very considerably shortens the distillation.

Gas-Purifying Plant.—Klein, J. D. L., of Copenhagen. No. 14,465 June 27, 1904.

The claims for this invention are: 1. In purifying plants for gas-works, an arrangement which consists in connecting several purifiers by means of pipes and valves in such a manner that the gas may be directed either through any particular one of the purifiers or through two or more of them successively—in the latter case so that the purifiers may be arranged in any order desired. 2. In purifying plants for gas-works, an arrangement of sieves consisting of bars which are diamond shape in cross section or are shaped roof-like on top and have large open spaces between one another, "for the purpose of increasing the useful purifying area of the sieves, and for the purpose of preventing a premature caking-up of the purifying material nearest the sieve."

The main gas-pipe runs between the purifiers A and B (p. 613), but is, in the space between them, divided into two parallel ducts C and D. These are connected near the centre by a branch; and at the front and rear end of the purifiers they have other branches, connecting them to the nearest purifier. In the branches, on either side of each of the

inlets and outlets, a valve is placed—making eight valves in all. By this arrangement, the purifiers can be used in all possible combinations—either one at a time or both together. In the latter case, the gas can first enter purifier A or B, as desired; and it is possible to obtain full use of the purifiers at any time. The two purifiers normally act in series—for instance, in the order A B—so that the purifier just regenerated is the last member in the series; but when A needs new purifying material, the gas is conducted through B alone during the time it takes to renew the material. As soon as A is regenerated, the valves are reversed, so that the gas passes through both of the purifiers, but now in the order B A. Later, when B needs renewing, the proceeding is reversed.



The arrangement of pipes and valves described is only one special mode of application of the principle herein set forth—namely, such an arrangement of the piping that the gas may, at will, be directed exclusively through one purifier or the other, or through two or more purifiers, and then in any order desired."

For the purpose of getting still greater efficiency of the area of purifiers, sieves of special construction are recommended to be employed. These sieves (as shown) consist of bars having a diamond shaped cross-section, or are shaped roof-like on the top. The bars are placed far apart, "so that the dead area taken up by them is not nearly as large as in the sieves commonly used." Concerning this arrangement, the patentee remarks: "The natural apprehension that the material might fall through sieves having such wide openings has proved, in practice, to be unfounded, if the bars are placed with their diagonal planes vertical and horizontal. Experience proves that in this case the purifying material itself forms arches from bar to bar; the inclined top surfaces of the bars serving as abutments. The sieve bars may be laid down separately—suitable guides being provided in the sides of the tank; or they may be connected to form a continuous sieve—making it possible to bring the bars in place simultaneously. In order to keep the bottom space of the purifier completely free for purifying material, the bottom-sieve is preferably made of the same type as the older form of sieves. The objection that the purifying material nearest the sieve openings is apt to cake up before the rest of the material, is met by the new shape of sieve described, for the reason that here the free area of percolation is not essentially restricted. In case of the bottom-sieve, the objection mentioned is met by placing a thin layer of bark immediately on top of the sieve."

APPLICATIONS FOR LETTERS PATENT.

17,712.—Nash, J. G., "Gas-producers." Aug. 15.
17,795.—Marshall, F. D., "Gas-purifiers." Aug. 16.
17,799.—Wilson, H. F., "Coin freed apparatus." Aug. 16.
17,853.—Horsfall, J. E., "Charging and discharging gas-retorts." Aug. 17.
17,868.—Gumprecht, F. G., "Multiple supply gas-valve." Aug. 17.
18,878.—The Richmond Gas Stove and Meter Company, Ltd., and Sherburn, W. H., "Radiators or stoves heated by gas or other combustible." Aug. 17.
17,943.—Oliver, C., "Enclosing globes or lanterns of lamps for street lighting." Aug. 18.
17,947.—Salter, H. J., "Pipe-joints." Aug. 18.
17,960-1.—Clerk, Dugald, Bickerton, H. N., and Bradley, H. W., "Internal combustion motors." Aug. 18.
17,966.—Elston, H., "Petrol gas-light." Aug. 18.
17,982.—Child, J. F., and Francis, S., "Governors for gas-burners." Aug. 18.
17,989.—Simpson, W. S., "Starting appliance for explosion engines." Aug. 18.
18,017.—Hanwell, H. W., "Shade fittings for 'harp' gas-fittings." Aug. 19.
18,047.—Haber, F., "Controlling the composition of gaseous mixtures." Aug. 20.
18,068.—Adams, M. J., "Gas stoves and heaters." Aug. 20.
18,075.—Cranson, T., "Automatic gas-lighter." Aug. 20.
18,106.—Willson, T. L., "Automatic gas-buoy." Aug. 20.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Engineers and Contractors.

Sir,—I will deal with Mr. Holliday's points as to experts, &c., in the full communication I have promised. But I cannot allow him to misrepresent me.

I have not, "on several occasions," attacked contractors as a body or generally. I am well known to large numbers of contractors of reputation, and esteem and well know their value and abilities in useful co-operation. Those who know me better than Mr. Holliday does, will smile at his statement.

Aug. 27, 1904. H. E. Jones.

Sale of Gas on its Calorific Value.

Sir,—I have read with great interest Sir George Livesey's opinions on present and future parliamentary restrictions with regard to the quality of the gas supplied by gas companies for ordinary use, and, as a gas engineer, I am bound to agree heartily with him. I would suggest that, instead of the futile and hindering luminosity tests, a system of selling British thermal units should be adopted *voluntarily* by those who have the control of gas undertakings. Why not have an automatic calorimeter constantly working, and then, by averaging the calorific value of the gas for a fixed limited period, sell the gas at so much per million B.T.U.'s? This would allow gas engineers great scope; and the consumers would be actually paying for the heat units they consumed, and no more. It is these that are wanted, now that flat flames are almost obsolete; and if the calorific value of the gas were reduced, the consumers' charges would be automatically adjusted according to the actual value of the gas to them. Parliamentary restrictions, except possibly with regard to price, would be quite unnecessary; and consumers would be satisfied that they were getting what they paid for, and *vice versâ*. An automatic calorimeter would be a sure and easy instrument to devise and operate; and would it not put an end to the petty follies of the present system?

Aug. 23, 1904. Juvenis.

"Radiant."

Sir,—We beg to thank you for your article on "Radiant," which is fair criticism. We are glad you find the fuel does act as stated when placed in a bunsen burner—viz., burns with a peach-coloured flame.

The small piece sent was about the thickness of the mould in which we have the fuel made up. "Inexhaustible" means that it does not burn away in a bunsen flame; it has no connection with the cost of material or otherwise. We have not yet got the moulds made; but as soon as they are ready, we will send sufficient for a comparative test against the ordinary ball-fuel.

With regard to the edges falling off, so far the fuel has not acted in this way before. We will pay attention to the moulding, and see that no ragged edges are left to drop off. We have found that "Radiant" gets harder with the heat.

We admit that plants absorb carbonic acid; and what we intended to convey was that the fuel acted in a similar manner to a plant.

We have never suggested that "Radiant" lights up instantaneously like nitrate of thorium and cerium (we doubt if these nitrates would light up instantaneously if they were ½ inch thick), but that it glows brightly like a piece of coal when placed in a bunsen flame, and does not burn away like coal.

We do not assert that carbonic oxide is in the air in large quantities; but, according to the medical fraternity and rival gas-stove makers' catalogues, it is present in the air of a room after a gas or oil stove has been burning. We admit that it is a poisonous gas, and that the air should be cleared of it; and that is precisely what we claim "Radiant" does—*i.e.*, takes up carbonic oxide and carbonic acid, and turns it into oxygen.

We have no other explanation to offer with regard to the peach-coloured flame. As, however, you very correctly point out, the best way is to test it, which we are quite prepared to submit to.

Aug. 26, 1904. Two Inventors Who Are Very "Radiant" At Their "Bright Prospects."

Proposed Extension of the Rothwell Gas-Works.—Messrs. J. Eunson and Son, of Northampton, have lately presented to the Rothwell Urban District Council a long report on the condition of the gas-works. They advise the erection of a new retort-house to contain four benches of six retorts, 10 feet long, which they reckon would produce 150,000 cubic feet of gas per day; also a new condenser and an additional purifier, which will augment the purifying power by 50 per cent. They suggest increasing the storage by adding a lift to the gas-holder, which will bring up the capacity to 75,000 cubic feet. It is estimated that the cost of the proposed extensions will be £2580.

Letting Gas-Cookers on Hire at Southport.—Steady improvement is maintained in regard to the extension in the use of gas-cookers at Southport. Since the end of March, 2000 new cookers have been ordered, and the system is open to Ainsdale, Birkdale, and Banks as well as to Southport. The Chairman of the Gas Committee (Mr. Trounson) maintains that the present value of the cookers let out on hire, added to the amount received by way of rental, would quite cover the original cost; so that the Committee have had the use of the cookers without any charge to the ratepayers. He further says that if they had another £5000 invested in cookers, there would be the possibility of a reduction in the price of gas.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, Aug. 17.

(*Before Mr. Justice* BIGHAM, *Vacation Judge.*)

Hill v. Governor and Company of Chelsea Water-Works.

This was a motion which had come before Mr. Justice Farwell on the 11th inst., and, by arrangement, stood over till to-day to be dealt with by the Vacation Judge.

Mr. MOULTON said he appeared on behalf of certain shareholders who sought to obtain an injunction restraining the Company, until the trial of the action, from proceeding with the distribution of the assets. The action was really for a *mandamus* to the Directors to summon meetings as prescribed by the Metropolis Water Act, 1902. This Act provided that when the money had been paid to the Water Companies, the Directors should prepare a scheme for its distribution among the various classes of shareholders; that a copy of the scheme should be sent to each shareholder; and if, within a month from the date of the notices, shareholders to the value of £20,000 should require the Directors to submit the scheme to a meeting, such meeting should be held. If a majority of any one class objected to the scheme, then it should be taken by petition to the Court of Chancery, to decide what was the proper one. Certain of the preference shareholders were not satisfied that they had been given enough under the scheme; and they issued a circular asking the other preference shareholders to send in requisitions, as provided by the Act. A good many were sent in, and the Directors then circularized the shareholders, with the result that some of the requisitions were withdrawn. At the end of the month, the plaintiffs applied to the Company to know if shareholders to the amount of £20,000 had sent in requisitions; and not getting a satisfactory answer, the present action was commenced.

Justice BIGHAM: Do you say that if a man sends in a requisition he cannot withdraw it?

Mr. MOULTON said his contention was that if the requisition was once sent, in the other processes mentioned in the Act must be gone through. At the trial, he should contend that the wording of the Act had been complied with; and the Directors ought to submit the scheme to a meeting of shareholders.

Mr. WAGGETT said if this had been a small matter, some arrangement might have been come to; but it was not, as it affected stock to the amount of £3,600,000. The dates were sufficient to put the plaintiffs out of Court. On the 22nd of June, the Directors notified the shareholders that the stock would be dealt with within a month; and on the 22nd of July the scheme, according to the Directors' view, became binding. On July 26, plaintiffs were informed that the scheme would be carried out; and the writ was not issued till Aug. 9. The stock was to be distributed after the 1st of September.

Mr. MOULTON said he understood that in the case of the other Companies the distribution would not take place till October.

Mr. WAGGETT said he was instructed that it would be done as soon as possible after the 1st of September. The proportions of stock had been allotted on the scheme, and the stockholders had been told the amounts they would receive; and many transactions had since taken place on the faith of this statement. The requisitionists did not hold stock to the value of £20,000; and another point was that the requisition must be sent in by holders of stock of this value in each class. He further urged that many of the requisitions were bad, as, the shares being in joint names, they had not been signed by all the registered proprietors.

Justice BIGHAM asked how many good applications there were.

Mr. WAGGETT said £6250 of 5 per cent. preference, and £5923 of 4½ per cent. preference.

His LORDSHIP directed the motion to stand over till the 24th inst., in order that evidence might be filed showing the amount of withdrawals.

Wednesday, Aug. 24.

On the case coming again before his Lordship this morning,

Mr. MOULTON stated that during the adjournment a further affidavit had been put in, but he could not say that it gave all the information wanted, because there were various questions about dates which depended on seeing the requisitions, and when plaintiffs' Solicitors applied to see them, they were not allowed to do so. Each of the requisitions they had seen had the date of withdrawal marked upon the face. The amount supporting the plaintiffs was upwards of £21,000.

Justice BIGHAM: Supposing those who have signed in only one name are struck out. Do you then fall below the £20,000?

Mr. WAGGETT said the amount would then be £13,000.

Justice BIGHAM asked whether the plaintiffs could refer to any authority which showed that, where shares were held in joint names, it was sufficient for merely one of the joint holders to sign.

Mr. MOULTON replied that section 78 of the Companies Clauses Consolidation Act (which was incorporated in the Chelsea Water-Works Act) provided that if several persons were jointly entitled to a share, the person whose name stood first on the register was, for the purpose of voting, deemed the sole proprietor; and this section he contended applied in the present case.

Justice BIGHAM pointed out that all the section did was to give the right of voting.

Mr. MOULTON said this was in the nature of voting. There was a similar provision about sending notices to joint holders—the first person on the register having the power to give a proxy or to vote.

Justice BIGHAM: But he has not the power to sell the shares, and he may be seriously affecting their value by his procedure. It is true the Act of Parliament gives him power to vote, but it does not give him power to send in a requisition of this kind; and I am not going to make any law about it.

Mr. MOULTON said what the Court had to do was to see whether there had been a sufficient requisition.

Justice BIGHAM said that, as at present advised, he did not think there had been. There were two difficulties in the plaintiffs' way. First, they had not a sufficient number who had signed; and, secondly, of those who had signed, a large number appeared to have withdrawn their request.

Mr. MOULTON remarked that he thought he had a sufficient number properly signed, without considering the withdrawals.

Mr. WAGGETT said he could give the exact figures. There were £19,276, supposing there was no objection as to withdrawal, who were in time, and £1600 were out of time; but including these, and taking out those signed by only one of the holders, the £21,000 was reduced by £2353. However, before his friend proceeded further, he desired to take the preliminary objection that the requisition must be signed by holders of £20,000 of each class. It would be absurd to say that the holders of ordinary shares could compel a meeting to be held of the preference shareholders; and, moreover, the circular sent out by plaintiffs' Solicitors plainly intimated that, in order to prevent the scheme becoming binding, requisitions must be received from the holders of each class to the amount of £20,000.

Mr. MOULTON argued that, Parliament having fixed the *quantum* of dissent at £20,000, it was immaterial to see to what class it belonged, so long as in the aggregate it came to this amount, as the object of dissent might affect one class or all classes. As he had received support from holders of stock to the amount of upwards of £20,000, he asked that the scheme should be submitted to a meeting.

Justice BIGHAM said the shareholders in the class to which the applicant belonged had not, to the aggregate value of £20,000, signed the requisition as required by the Act, and therefore the application would be refused, with costs.

Mr. MOULTON asked that the costs should be made costs in the cause.

Justice BIGHAM declined to accede to the request; stating that the whole thing was now done with, and therefore he dismissed the suit with costs.

The Supply of Accounts by Gas Companies.

The Titchfield Gas and Coke Company were summoned on Monday last week, before the Justices at Fareham, on a charge of having contravened the Joint-Stock Companies' Act by failing to forward the annual return and summary of accounts to the Registrar. Mr. Leonard Warner, who prosecuted for the Treasury, stated that the Company had disregarded warnings which had been forwarded to them in February of last year and in May of the present year. Mr. Graham Whitlock, for the Company, explained that the failure had been due entirely to an oversight. The undertaking was but a small one, and during the 39 years of the Company's existence there had been no prior neglect of the kind. The Bench held that they had no option but to impose a penalty. The fine was £3 and costs.

Leeds Corporation Gas-Coal Contracts.—At a meeting of the Leeds Gas Committee on Wednesday, tenders for the supply of gas coal for the ensuing year were accepted. Altogether, contracts for 375,000 tons of coal were placed; the orders being distributed among 41 firms—this being about half-a-dozen firms more than received orders last year. The object of the Committee in distributing them so largely is to secure greater regularity in delivery, and to avoid the danger of a stoppage of supplies, which would occur in the event of a colliery with a large order in hand being involved in a strike. The average price at which the contracts were let works out at about 7d. per ton less than last year—a reduction which means a saving to the city of well over £10,000. Included in the tenders accepted was one for 30,000 tons of cannel coal.

Suicide by Gas.—An inquest was held last Thursday by Mr. R. H. Wellington, at the Westminster Coroner's Court, on the body of Charles Henry Thomas (33), labourer, who was found dead with his head in a gas-stove. The mother stated that her son had been out of work a great deal, and had tramped miles in search of employment. On the previous Monday morning he was not well, complaining of pains in his head. He said he had been walking about all night and all day, and was tired. She went to work, leaving him in bed; and on returning in the evening she perceived a strong odour of gas. Her son lay on the floor, with his head in the oven of a gas cooking-stove. The tap of the stove was turned on, and he had placed a footstool in the oven for his head to rest upon; stuffing up the apertures with towels, &c. Deceased left a note to the effect that he dreaded the streets, and wishing his mother good-bye. A verdict of "Suicide while of unsound mind" was returned.

The Dublin Electric Light Scheme.—A special meeting of the Dublin Corporation, called at the instance of the Lighting Committee to get authority for the extension of the generating plant at the Pigeon House station, was recently held under the presidency of the Lord Mayor. Mr. Irwin, the Chairman of the Committee, moved the adoption of the report, which recommended further expenditure to the amount of £19,227 for plant, to be ready by the 31st of October next. There would also be, in addition, fees at the rate of 5 per cent. to be paid to Mr. Hammond, the Consulting Engineer, and other expenses. In fixing the site of the new plant, it was found that there would only be room for one new set in the existing engine-house, and they had therefore decided to put in the largest possible size of machinery. Mr. Vance moved, as an amendment, that the report be referred back to the Lighting Committee, with instructions to hold the Contractors to their obligations in respect of the four sets of engines condemned by Mr. Hammond, and with the further instruction that no extension of the electricity supply undertaking should be sanctioned by the Council until the Pigeon House scheme was completed, and a full inquiry held and report made as to the possibility of reducing the loss of upwards of £14,000 per annum now falling on the ratepayers. After a heated discussion, the amendment was ruled out of order, and the report was adopted by 22 votes to 7.

MISCELLANEOUS NEWS.

TOTTENHAM AND EDMONTON GAS COMPANY.

For the first time, so far as recollection goes, the proprietors of this Company met on the works last Thursday afternoon for their half-yearly meeting. Before their handsome offices were erected in the High Road, Tottenham, they assembled for a great number of years in the old offices in Willoughby Lane adjoining the works; and then those who cared to do so were able to keep themselves well informed from actual inspection as to the changes that took place on the works. For three-and-a-half years, however, the meetings have been held in the new offices; and therefore, during that time, there has been no opportunity for shareholders making a general survey of the works. But it was again given last week; the Chairman (Mr. Corbet Woodall) and his colleagues of the Board readily acceding to a suggestion that an inspection should be made. That this was much appreciated was testified to by the great excess beyond the customary number of proprietors who attended. The period since the last meeting in Willoughby Lane has been one of special activity on the works; and over its face has come a change, under the energetic engineership of Mr. A. E. Broadberry, that almost blots the old arrangement of the works from memory. The character of the alterations and extensive additions was delineated in the two descriptive articles which appeared in the "JOURNAL" for Dec. 1 and 8 last. Further extensions are in view; and one of the new buildings which will have an important part in future operations was the scene of the meeting on Thursday. This is a magnificent building, comprising a new exhauster-house, with a workmen's recreation room above, and the room in which will be located the electricity plant for driving an installation of De Brouwer charging and discharging machinery to be installed in a large new retort-house, the foundations for which are now in and ready for the commencement of the superstructure. It was in the portion of the building in which the electrical machinery will be eventually housed that the meeting took place.

A Question of Meter Connections and Disconnections—Consumers' Complaints—In Defence of Carburetted Water Gas.

The chair having been taken by Mr. CORBET WOODALL,

The SECRETARY (Mr. James Randall) read the notice convening the meeting; and the report and accounts were afterwards taken as read.

The CHAIRMAN, in moving their adoption, said this was the first time they had held a meeting of the proprietors of the Company within the gas-works. The suggestion came from shareholders that this should be done; and the Directors themselves felt there was a certain propriety in the occasional gathering of the proprietors on the works, so that they might see in what way the money they were called upon to subscribe was being spent. The proprietors would find the works in a state of transition. There was a great deal of work going on; but he hoped that, when after the meeting they made their visit to the various parts, this fact would not detract from the interest of the visit. He was glad that on this occasion the Directors had again a satisfactory report of the Company's affairs to lay before the proprietors. The rapid growth of the business, to which reference had very frequently been made, continued; and there was no evidence in view of any likely check. The price of gas was reduced by 2d. per 1000 cubic feet from the commencement of the half year, and this entitled the proprietors to an additional ½ per cent. dividend. This was an addition of about 10 per cent. to the dividend; and this the Directors recommended should be paid. After it was paid, the balance carried forward would be slightly in excess of the amount carried forward at this time last year. The amount expended upon the repair and maintenance of works, mains, meters, stoves, and fittings had been more than £3000 in excess of that spent in the same half of 1903. Otherwise, there was nothing very special in the figures of the revenue account calling for special observation. The only point which he had almost forgotten to mention was that the balance carried forward was not only after paying the slightly increased dividend, but also after providing for the reduction in the price of gas. As the result of a joint investigation by the Engineer and himself of the details of the large expenditure upon repairs and maintenance of the distributing plant, Mr. Broadberry had prepared for him some statistics, a selection from which he (the Chairman) thought would be of interest. During the past year, they had laid service-pipes to the total number of 5311. Of these, 1282 were for ordinary meters, and 4029 for prepayment meters. They had fixed meters to the number of 10,631. Of these, 8034 were prepayment meters, and 2597 ordinary ones. He would like to give the proportion fixed in the various districts supplied by the Company. In Tottenham, they fixed 1215 ordinary meters, and 4624 prepayment ones. In Wood Green, 861 ordinary and 960 prepayment were fixed. In Edmonton, only 209 ordinary, and 2235 prepayment were fixed; while in Southgate, there were 312 ordinary and 215 prepayment. The last-named was the only one of the districts in which the ordinary supplies exceeded the prepayment. This was interesting and instructive, as showing the difference in the class of consumers in the various districts supplied by the Company. The meters disconnected numbered 6286. The ordinary meters taken off represented 14 per cent. of the total number, and the prepayment meters 28 per cent., or 22 per cent. over the whole. That was to say, there was one meter in every seven of the ordinary consumers removed, and one in every three-and-a-half of the prepayments. This illustrated, in a striking manner, the migratory nature of their population. One out of every seven ordinary, and one out of every three-and-a-half consumers moved their residences during the year. It also showed, in conjunction with the two preceding sets of figures, that, rapidly as the population was growing, building was increasing still more rapidly. In addition to those named, it had been necessary to change meters for testing, faults, disputes, &c., to the number of 2084, or one in thirteen of the total fixed. Of gas-stoves, there were fixed 1470, removed 777, and changed 138. The stoves removed and changed had to be cleaned and renovated. It would be noted that these totalled to 915, or 18·46 per cent. of the number in use; showing that each stove remained out on hire about five years or rather over. Of complaints there were received 10,221; but of these only 1211 were complaints of short supplies. It appeared from the figures that each ordinary consumer sent a complaint of some sort about once in four years; and each prepayment consumer once in two-and-a-half years, or, taking an average of the whole, each consumer wanted some attention once in every three years. A noticeable feature was that the Company's consumers averaged only one complaint of short supply in 25 years; and then the cause was dirt, corrosion, or water—never in recent years of naphthalene. He did not know how these figures compared with the experience of any other Company. They would, however, enable the proprietors to form some idea of the amount of work which fell upon the officers and outdoor staff. The average consumption per consumer in the district was the lowest of any London or Suburban Company, by a considerable margin; and this involved a larger proportionate quantity of distributing apparatus, which had to be maintained. They had during the half year added another section to the plant for making carburetted water gas, and were now able to produce of this gas nearly 4 million cubic feet per day. An effort had been made recently to disparage the value of carburetted water gas, and to discredit it with consumers. The attack was presumably serious, though the assailant avowed ignorance of the subject; and, in regard to the particular case on which his condemnation of the system was founded, gave explanations which showed that the trouble experienced was due not to the making or supply of the gas, but to circumstances which could have been readily rectified. To those who had had long experience of carburetted water gas—and the number was now very large—it might seem unnecessary to again express the appreciation of the management of the Company of its many advantages—economical and otherwise. They did this without hope of influencing persons who put prejudice before fact, and condemned a system they would not even try to understand. He referred to the matter only because some shareholder or consumer might have seen, and attached weight to, the attack, coming as it did from "the house of a friend." The Company had satisfied themselves, and not they alone, but a hundred other important undertakings in the hands of companies and corporations, and controlled by able engineers, were also convinced, as the result of experience, that carburetted water gas had been, and was, of immense value to the gas industry; and it was noteworthy that the only reputed failure (at least within his knowledge) had been where, it would appear, success had not been desired. They were each entitled to hold and express opinions upon such matters as they were now discussing; but those opinions should be published with some sense of responsibility. A man might burn down his own house to roast his own pig; but he was an incendiary if he burnt his neighbour's for that purpose. If anything other than a sense of duty to the public or the industry dictated the utterances referred to, they were, he thought, not only justified in protesting, but were called upon to protest against them strongly. During the half year, the quality and quantity of the supply had been well maintained. Considerable extensions and enlargements of mains had met some slight deficiencies in pressure which were becoming noticeable. In the opinion of the Directors, the gas the Company were sending out yielded to the consumers the maximum efficiency and value, whatever the purpose to which he applied it, at the minimum cost. The Company's relations with the Local Authorities and consumers, he was glad to say, were of a very friendly character. The Company had been most careful as to the obligations which they received from Parliament when they were given the powers under which they were working. They had not rashly undertaken any responsibilities; but having undertaken obligations, it had been their effort, and always would be, to fulfil them in the best possible way, and so maintain—he hoped for a long time to come—the relations to which he had referred. *A propos* to the visit to the works, the Engineer had handed to him a document which was found among the papers of the late Mr. Thomas Glover. It was a description of the Tottenham Gas-Works as they were in the year 1848. He (the Chairman) had found this very interesting indeed; but he would not detain the proprietors by reading it. He might, however, mention that, at the time named, the late Mr. Alexander Angus Croll was the proprietor of the works. Mr. Croll was a gentleman of great ability and activity a quarter of a century ago in the promotion of gas lighting. In this document, the works were spoken of as occupying an area of some 2 acres, and that portion which was not occupied by buildings and plant was "in a good state of cultivation, and tastefully laid out in grass lawns, flower plots, and gardens." A "beautiful fountain" faced the superintendent's house, supplied with a constant stream of water from an artesian spring. They would like that beautiful fountain fed by an artesian spring back again (laughter); but if they were now to have a fountain at all, they must pump water from 200 feet or more before they could have it to use. At that time, too, there were twenty retorts in use; and he mentioned this because, after all, 1848 was not very long ago. It was but little longer than 1851 when their youthful Secretary joined the Company. (Laughter.) Mr. Randall had been telling him that at that time—when he was in the prime of life and with a long period of service before him, and they hoped he had a long period before him still—the total revenue of the Company was £2800 a year, while it was nearly £200,000 a year now. What a very modern industry this was? After the meeting, the Directors and the officers would have much pleasure in going round the works with the proprietors, and in making the visit as interesting as possible. He might add with regard to the room in which the meeting was being held, that it would bear a very different appearance this time next year. They were, as the proprietors were aware, about to erect a very large retort-house. The present intention was that the retorts in that house should be charged and discharged by electrical power; and the room in which they were assembled would contain the machinery for this purpose.

Mr. HENRY BAILEY seconded the motion, which, without discussion, was unanimously carried.

Moved by Mr. JAMES WARREN, and seconded by Mr. G. T. WATSON,

a dividend at the rate of 6¼ per cent. per annum on the "A" consolidated stock and 4¾ per cent. on the "B" consolidated stock, less income-tax, was declared.

Proposed by the CHAIRMAN, and seconded by Mr. LIVICK, Mr. Warren was re-elected to his seat at the Board; as was also Mr. Watson, on the proposition of Mr. WARREN, seconded by Mr. SAMUEL CUTLER.

Mr. J. T. RANDALL proposed the re-appointment of Mr. J. L. Chapman as an Auditor; and this, having been seconded by Mr. H. KNIGHT, was also unanimously passed.

Mr. BAKER, pursuant to notice, moved that the annual remuneration of the Directors be increased from £1200 to £1500 as from July 1 last. He spoke of the pleasure it gave him in doing this, and also highly of the services of the Board, and of the great value that the professional knowledge of the Chairman was to the Company. He (Mr. Baker) found that in January, 1876, the Directors had a remuneration of £500 per annum, and at that time the year's rental was £21,460. Passing along eight years, to December, 1884, the Directors' remuneration was £750; and the year's rental was £37,403. In June, 1897, the Directors' remuneration was £1000; and the year's rental £72,940. They then got to June this year, when he found that the Directors' remuneration was £1200, and the year's rental was £145,773—practically double what it was in 1897.

Mr. PIKE seconded the motion; and it was heartily agreed to.

The CHAIRMAN, in acknowledging the vote on behalf of himself and his colleagues, remarked that, having regard to the growth of the business the work of the Directors, as well as of the staff, had also grown very considerably. It would be a mistake to suppose that the work of the Directors was confined to the mere attendance at the meetings of the Board. They were all—he perhaps especially, because of his position as Chairman—in constant touch with the officers; and while this was a great pleasure, because they worked so harmoniously together, yet it did make a considerable demand upon their time. Mr. Baker had mentioned the increase in revenue; but, if he would forgive him (the Chairman) saying so, his statement would have been more complete if he had intimated that the largely increased revenue was earned at a lower price for gas. The price of gas had been reduced from time to time, so that, if the increase of business had been taken upon the amount of gas made, the figures would have been even more striking.

A resolution voting 100 guineas to the Tottenham Hospital Building fund was also passed unanimously.

Mr. H. D. ELLIS, in moving a vote of thanks to the Directors, officers, and staff, said there was one point in the accounts to which he should like to refer, and that was the expenditure of capital. A great deal of money had been spent in the half year; and some people might be almost frightened. The amount of increase in the six months was no less than 5 per cent. on the capital involved—in other words, the capital expended had been raised from £428,000 to £450,000. It was extremely gratifying, in testing this with the statement of gas made and sold, to see that the business had increased so much more in ratio to the expenditure of capital. The expenditure per 1000 cubic feet of gas sold now was something under 10s.; and, if his memory served him correctly, he thought that last year it was some 2d. or 3d. over 10s. This was about £490 per million cubic feet. If they could spend money and do good business, this thoroughly justified the expenditure of capital. This all showed how carefully the Directors had looked into this matter; and though the proprietors had been called upon to subscribe a large amount of capital, the Directors have spent it wisely and well.

Mr. JAMES CLOUDSLEY seconded the motion; and it was unanimously agreed to.

The CHAIRMAN, in responding for the Board and officers, remarked that it was indeed gratifying to find that, while they were spending these large sums of money, the relation of capital to business was at the present time a decreasing one. He also spoke of the thoroughly good support which was given to the Company by the general body of workmen.

Tea was afterwards served in the new recreation room; and subsequently, accompanied by the Chairman and Directors, the Engineer (Mr. A. E. Broadberry) and his Chief Assistant (Mr. J. Terrace), Mr. Randall, and other officers, the proprietors made a tour of the works, with the large extensions of which all were apparently much gratified.

ASCOT DISTRICT GAS COMPANY.

The Ordinary General Meeting of this Company was held last Tuesday, at the Offices, No. 50, Cannon Street, E.C.—Mr. JOSEPH MANWARING in the chair.

The SECRETARY (Mr. W. A. Schultz, F.C.A., J.P.) having read the notice convening the meeting, and other formal business having been transacted, the report and accounts were taken as read.

The CHAIRMAN said the accounts which he had to place before the shareholders showed a continuance of the prosperity which the Company had been enjoying now for some time past. The quantity of gas manufactured exhibited an increase on that of the corresponding half of last year of 922,000 cubic feet, or nearly 5 per cent.; and the yield of gas per ton of coal carbonized had been 11,011 cubic feet. The shareholders would notice that there had been no further capital expenditure on account of new buildings or plant. He was glad to say that the plant was now working very satisfactorily. The only outlay had been in the necessary extensions of the mains of the Company; and in no case had pipes been laid unless the Directors saw there was a corresponding increase of consumption to compensate for the outlay. The sales of gas showed an increase of 8·4 per cent.; and the unaccounted-for gas was only 1,122,000 feet, or practically 5·6 per cent. of the quantity made. With the extended area of mains, this must be considered highly satisfactory; and much credit was due to the Engineer for the care exercised by him whenever the mains or services were being laid. The residual products bore very satisfactory comparison with the items of the corresponding half year, although the prices now obtained for tar and liquor were not quite so high as those of last year. The number and increase of consumers were shown by the following: Ordinary consumers, 684 at June 30 last, as compared with 594 at the corresponding date last year; prepayment consumers, 341, as compared with 251; stoves on hire, 485, as compared with 385; and public lamps were the same—84. It should be remembered when comparing the accounts of the past half year with those for the corresponding half, that the whole of the six months had borne the reduction of 3d. per 1000 cubic feet in the price of gas, made in March, 1903. There was only one other matter to be referred to. On June 21 last, the Directors offered for public auction £4000 of perpetual debenture stock, in order to pay for the recent extensions of the works. They were advised earlier in the year to postpone the issue until June; but the anticipations of the Auctioneer were not realized, inasmuch as just at that time there was a depression in the Money Market, and none of the debentures were bought. However, £2500 had been issued privately; and the Directors were prepared to issue the remainder to the shareholders. He had great pleasure in moving the adoption of the report and accounts.

Mr. ALFRED KITT said he had great satisfaction in seconding the motion, because, notwithstanding the reduction of 3d. per 1000 cubic feet to which the Chairman had referred, they had earned the dividend, and carried forward a larger balance.

The motion was unanimously carried.

Dr. STRONG, J.P., in moving the declaration of a dividend at the rate of 5 per cent. per annum for the half year, less income-tax, remarked that the dividend had been thoroughly well earned; and the Company were progressing very favourably. Each year the business kept advancing—he would not say by leaps and bounds, but there was steady progress. He believed that each succeeding year would find them with an increase in the gas made and consumed, and with an improvement in the general financial position.

Mr. S. SPENCER, in seconding the motion, said he supposed that, with the reduction of 3d., they might look forward to an increase in the dividend very soon.

The motion was adopted.

The thanks of the shareholders having been heartily accorded to the Chairman and Directors,

Mr. SPENCER proposed a vote of thanks to the officers, staff, and employees generally. He remarked that the balance-sheet showed they were fully deserving of the thanks of the shareholders. For many years past—especially since Mr. Brooks had been their Engineer and Manager, there had been improvement. The make of gas was now something like 11,000 cubic feet per ton of coal carbonized; and the leakage was only 5 per cent. This was somewhat surprising, seeing the large extent of mains in the Company's district.

Mr. HENRY WOODALL, in seconding the proposition, said that, having such an intimate knowledge of the working of the concern, he could do this with the greatest possible confidence. The balance-sheet which had been submitted to the shareholders showed they had arrived at a period of refinement which it was almost impossible to excel. Whether in the office or the works, they were most admirably served; and he could not conceive of any more perfect work being done.

The proposition was cordially agreed to.

Both Mr. SCHULTZ and Mr. BROOKS responded; the latter stating that it was a great pleasure to him to be able to produce such results as those shown in the balance-sheet. On the suggestion of Mr. Kitt, he also mentioned that the quantity of gas sold per ton of coal carbonized was 10,218 cubic feet. The coke sold was 9⅓ cwt. to the ton of coal used; and the proportion of gas sold to the private consumers was correspondingly high—viz., 96 7 per cent.

PROVINCIAL GAS AND WATER COMPANIES.

Gas.

Increased Consumption Follows Reduction in Price at Bath.

At the half-yearly general meeting of the Bath Gas Company last Friday, the Directors reported that additional gas was sold during the six months ended June 30, both for private and public lighting, the increase being 7 per cent., and the return in money nearly equal in amount to that of the corresponding half of last year, though the price had been 2d. per 1000 cubic feet less than in that period. The total receipts for residual products were, in comparison, less. Coke was better, through the larger quantity sold; but the markets generally had not been favourable during the half year. To provide for the increased demand for gas in the district, a new gasholder had been erected and was in use. The accounts accompanying the report showed that the revenue was £40,600, and the expenditure £30,799; the balance carried to the profit and loss account being £9801. The balance on this account was £13,787; and out of it the maximum dividend of 5 per cent. per annum was declared.

Meeting Competition at Camborne.

Presiding at the ordinary general meeting of the Camborne Gas Company yesterday week, Mr. H. P. Vivian, the Vice-Chairman, said that in the past year they had had for the first time to face the competition of the electric light, but had no reason to regret it. In the lighting of the streets, they had adopted the very best system of gas lighting, and he believed that not only the shareholders of the Company but the District Council and the general public were highly satisfied. The position of the Company had not been injured by competition, and they hoped to continue to pay the same rate of dividend as hitherto. Mr. W. Bailey, the Secretary and Manager, dealt at some length with the accounts, and pointed out that the receipts from the sale of gas were £2992, against £3028 last year. With regard to the lighting of the town, though he should have been very sorry if gas had not continued to be used, he advised the Directors to quote a price which would be remunerative. He believed the contract would leave a fair profit to the Company; and, from all he heard, the lighting was giving extreme

satisfaction. The works of the Company were being well maintained; and any modern gas engineer visiting them would say they were fairly up to date. The Company had really earned the dividend of 6 per cent.; and the prospects of a higher dividend were not remote. Replying to a question as to the leakage, Mr. Bailey said they had got the normal leakage down to 9¼ per cent.; but it had again risen to 13 or 14 per cent. There was no doubt that the face of the roads had been gradually worn away, so that mains laid 18 inches below the surface were now only 6 or 8 inches down. The accounts, which were adopted, showed a balance of profit of £646. A dividend of 6 per cent. was declared; and the Directors, Manager, and staff were heartily thanked for their services.

Attention to Consumers Rewarded at Cork.

The 71st half-yearly meeting of the Cork Gas Consumers' Company was held last Thursday—Mr. G. Lynch (the Chairman) presiding. The Secretary (Mr. J. S. O'Mahony) submitted the report for the half year ending the 30th of June, which showed a small decrease in rental, compared with the two previous half years. It was pointed out, however, that during both of these periods the Cork Exhibition was running. In comparison with other half years, there was an increase. The residuals showed a good return on the coals carbonized. According to the accounts, the total revenue was £28,752, and the expenditure £19,377; leaving a balance of £9375. The balance of profit and loss came to £8071. After placing £2504 to the depreciation fund, a sum of £5567 was available for distribution, out of which a dividend at the rate of 8 per cent. per annum was recommended. The Chairman, in moving the adoption of the report, said he might mention, for the information of some critics who objected to their declaring so high a dividend, that it was paid only on the nominal amount of the shares, which was £5; so that those who bought their shares at much higher prices received only a very moderate interest on their investment, considering that theirs was a manufacturing business, subject to various contingencies such as the cost of coals, freights, &c., and having severe competition to contend with. What was proposed to be added to the depreciation fund would bring it up to something approaching its proper amount; but the reserve fund was still very small, and much under what it used to be, and ought to be. The consumption of gas had not been equal to that of the half years when the Cork Exhibition was running; for it was not only at the Exhibition that the more gas was used, but also at hotels, lodging-houses, and in other ways. It was satisfactory, however, to find that the consumption continued higher than in any other corresponding half year; and it was larger than before the electric light was introduced. With the reduced cost of incandescent mantles, and the splendid Lucas lamps now supplied for indoor as well as outdoor lighting, they were in a better position than ever to defy competition. The use of gas for purposes other than lighting was increasing steadily, especially for cooking. The works and plant, as certified by the Resident Engineer (Mr. Jonathan Magrath), were in good order; and altogether he congratulated the shareholders on the present condition and prospects of their undertaking. Mr. Francis Mahony seconded the motion, which was agreed to; and the dividend recommended was declared. Mr. J. C. Rowe congratulated the Directors on the prosperous condition of the Company, and on the fact that it stood so well with the citizens, in spite of the efforts of local agitators. The Company paid proper attention to the wants of small consumers. Customers had spoken in praise of the prompt manner in which their complaints had been dealt with; and he believed this was no small factor in achieving the success they had now attained.

Record Dividends at Eastbourne.

The accounts presented at the meeting of the Eastbourne Gas Company on Monday last week showed a profit of £8289 on the working for the six months ending the 30th of June. This sum added to £14,417, the balance brought forward (after payment of the half-yearly dividend in February last), together with £34 received for interest, and less provision for income-tax, left £29,699 at the credit of the profit and loss account. The Directors therefore recommended that a dividend for the past half year should be declared at the rate of 15 per cent. per annum upon the £20,000 of original capital, and also upon the £12,490 raised on the "C" shares, and at the rate of 12 per cent. upon the £88,050 of capital raised on the "B" shares. This would absorb £7720, and leave a balance of £14,979 to be carried forward. The Chairman (Dr. Jeffery), in moving the adoption of the report, referred in sympathetic terms to the loss the Company had sustained by the death of Mr. Joseph Gorringe, who has been a Director for 34 years, and then proceeded to deal with the half-year's working. This, he said, was marked by improvement in four different respects. In the first place, there had been an increase of 7·1 per cent. in the sale of gas; secondly, there had been an improved make of gas per ton of coal; thirdly, they had experienced a considerable advance in the sale of coke; and, lastly, notwithstanding the loss of £1415 on the reduction in the price of gas by 2d. per 1000 feet, the total profit on the half year was £717 more than in the previous one. The capital expended now stood at £171,528, equal to £493 per million cubic feet, against £511 last year—an improvement of £18 per million. The sale of gas had increased from 158,156,000 cubic feet to 169,370,000 feet—an increase of 11,214,000 cubic feet. The number of consumers was now 3970 ordinary and 3259 prepayment—together 7229, against 6774 last year; being an increase of 455. The profit represented a sum of £8289, compared with £7572, or £717 more. The leakage was 5 as against 6½ per cent. Coals and gas making materials had cost £13,119, against £14,066, or a decrease of £907. The residuals had produced £8030, against £6979, or £1051 more. The other charges were almost identical with those of last year. The receipts for gas, meters, &c., amounted to £25,166, against £24,755—an excess of £411. This yielded a profit of £8298, which covered a dividend at the increased rate of one-eighth per cent. and left a balance of £600. The gas made per ton of coal was 10,500 cubic feet, against 10,250 cubic feet—a 2½ per cent. increase. The coke made for sale per ton of coal was 10·06 cwt., against 9·6 cwt. The tar produced per ton was 10 gallons; and the sulphate of ammonia made was 21·5 lbs., against 22·4 lbs. The works, he had been assured by their Consulting Engineer (Mr. H. E. Jones), were in perfect order and of abundant power. Their mains were now being increased in size; and he thought all who had perused the report must admit they had had a most prosperous half year. Though the price of gas had been reduced 2d. per 1000 cubic feet, involving a loss of £1415 on the six months, they were able to declare dividends of 15 and 12 per cent. respectively. These were record dividends. He had had the honour of appearing before the shareholders on many occasions, but never before had it been his privilege to submit for their acceptance dividends of such amount. Having the combined advantages of a reduced price and increased dividends, he thought the shareholders could not fail to be satisfied. How, it might be asked, had these results been effected? It had been by a rigid economy and by a wise expenditure. They had saved everything they could. Mr. Oke, in seconding the motion, congratulated the Directors and shareholders on the continued prosperity of the Company. The motion was carried unanimously; and the dividends recommended were declared. Mr. Clement J. Vinall having been elected a Director for the next two years, in place of the late Mr. Gorringe, and Mr. Frank Emary an Auditor, in succession to Mr. H. M. Emary, retired. Mr. H. E. Jones moved an addition of £250 to the salaries of the Directors. Mr. J. Hammond seconded the proposition. It was decided, however, to make the remuneration the same as last year. The best thanks of the shareholders were then formally accorded to the Directors, officers, and workmen for their attention to the business of the Company, and the proceedings closed.

Increased Gas Supply in North London.

At their half-yearly meeting last Wednesday, the shareholders of the North Middlesex Gas Company had the gratifying announcement, in the report presented by the Directors, of a continued increase in the Company's business; 9¾ million cubic feet, or 16¾ per cent., more gas having been sold in the six months ended the 30th of June than in the corresponding period of 1903. This increasing demand for gas necessitates further enlargements of manufacturing and storage plant, which have already been commenced; and land adjoining the works has been acquired for extensions. The revenue in the half year amounted to £14,335, and the expenditure to £10,538, leaving a balance of £3797 to go to the profit and loss account. The sum available for distribution was £5208; and the Directors recommended that dividends should be declared for the half year at the rates of 10 and 7 per cent. per annum on the original and additional capital, and 5 per cent. per annum on the preference capital. These would absorb, with £390 placed to the reserve fund, £3193, and leave £2015 to be carried forward. A neighbouring Company, the Southgate and District (formerly the Colney Hatch Gas Company) made good progress in the half year; the sale of gas having been 3,384,000 cubic feet, or 7·6 per cent., more than in the first six months of 1903. The revenue was £11,127, and the expenditure £8410; leaving £2707 to go to the profit and loss account. At the meeting on Thursday, the Directors reported a sum of £5019 available for distribution; and they recommended dividends for the half year at the maximum rates (10, 7, and 5 per cent. per annum). The payment of these would absorb £2255, and leave £2764 to be carried forward.

Rates and Taxes Affect Reduction at Salisbury.

The Chairman of the Salisbury Gas Company (Mr. G. Fullford), in moving the adoption of the report and accounts, and the payment of the usual dividends, at the recent annual meeting, said the work of the Company during the past year had been satisfactory; and he could again congratulate the proprietors on the business done. Owing to the economy and efficiency of the incandescent gas-light, its use was largely extended, and the sales of gas had considerably increased. There was also some economy in the manufacturing expenses, due to decreased cost of coal and the adoption of improved apparatus, with the result that they were able to annouce a reduction of 2d. per 1000 cubic feet in the price of gas, to take effect on and after the 1st of October. This reduction, he added, would have been 3d. but for one item—the large increase in rates and taxes, which was no less than £224 for the year; the local rates paid for this period being close upon £700. He would also point out that they did not sacrifice quality to cheapness in gas manufacture, but that both the photometrical value and purity of their gas was considerably above the standard required by their Act of Parliament. The report having been adopted, the usual complimentary votes of thanks were passed. Replying on behalf of the Directors, Mr. S. R. Atkins spoke in high appreciation of the Engineer and Manager (Mr. Norton H. Humphrys), who, he said, was a good business man and also a thorough scientist, well acquainted with the chemistry and engineering of gas manufacture and distribution. Mr. Humphrys replied for the staff, which increased from year to year, following the growth of the business. He thanked Mr. Atkins for his complimentary remarks, and said the staff in general would be glad to know that their services were appreciated.

Checking Municipal Extravagance at Watford.

While the Chairman of the Watford Gas Company (Mr. E. J. Slinn) had a very gratifying report to ask the shareholders to adopt at their half-yearly meeting on Thursday—the dividends recommended therein being at the rates of 13 and 10 per cent. per annum, free of income-tax—there was just one matter in connection with the working of the Company which was not altogether satisfactory. It was the high rating. He said the Company had been assailed, and they had had to fight. The result was that they obtained a slight reduction, though not what they wanted. However, they must be thankful for small mercies. There might be something good in the Valuation Bill; and if the system of quinquennial valuations were adopted, the Company would stand a chance of being left alone for four or five years. Referring to the item of parliamentary charges, he said the Company were obliged to take action in self-defence. They not only had to pay their rates and make their own living, but afterwards to pay to enable the Local Authority to keep their electric plant going. This they considered to be rather hard lines; and they thought the endeavours of the other side had not been in the right direction. But there was no doubt something to be said on both sides. The Company considered the Urban District Council indulged in too much speculation, and they tried to prevent it. The result of their efforts was the introduction of what was known

as the Northumberland clause, which, justified the action of the Directors, and would prove an advantage both to those who controlled the electricity undertaking and to the ratepayers at large.

A Fresh Start at Weymouth.

A parting and a welcome were the prominent features of the half yearly meeting of the Weymouth Consumers' Gas Company last Thursday. With regard to the business, the Directors reported that it had progressed very satisfactorily during the six months ending the 30th of June—98 additional meters having been fixed. The gas sold was 10 per cent. more than in the corresponding half of 1903; the gas rental showing an increase of £385, which but for the saving to the consumers of a somewhat similar amount, in consequence of the reduced price, would have been nearly £800. The Directors announced with regret that Mr. James Lowe, after 23 years' faithful service, had decided to retire from the office of Manager and Secretary at Michaelmas next; and recorded their appreciation of his skill and keen attention to the interests of the Company; its present satisfactory condition being, they said, largely due to his efforts. The accounts, which were taken as read, showed a balance of £4555, available for distribution; and the Directors recommended a dividend for the half year at the rate of 5 per cent. per annum, less income-tax. In the course of his address when moving the adoption of the report, the Chairman (Mr. J. E. Robens), after alluding to the past six months' work, referred to the general progress of the business. He said that as a Company they had very much to congratulate themselves upon during the last few years; in proof of which he gave the following statistics in regard to the triennial increase of gas—viz., from 1890 to 1893, 6 million cubic feet; 1893 to 1896, 8 millions; 1896 to 1899, 10 millions; 1899 to 1902, 14 millions; 1902 to June, 1904, 12½ millions. So that 50½ million cubic feet of gas had been added in 13½ years. When the works were taken over in 1867, the make of gas was 20 millions, and up to 1890—23 years—they were only able to procure 25 millions additional. But in the 13½ years since 50½ millions had been added to the make. Their reserve fund in 1890 was £1600; now it was £6299. The income of the Company in 1890 was £11,645; in 1903 it had increased to £22,061. He did not think they had any reason to be afraid of anything which might happen to them. They had carried on their business in order that they might give the town advantages from gas; and having received such a large amount of success in the past he did not think the town would forsake them in the future. He then alluded to the resignation of Mr. Lowe, and said that, as they must have a good Manager, they sought the advice of Sir George Livesey, with the result that, on his recommendation, they have appointed Mr. Douglas Colson, of Leicester. Mr. J. G. Rowe seconded the motion, and it was carried. A vote of thanks having been accorded to the Chairman and Directors, the former briefly responded and proposed a similar vote of thanks to Mr. Lowe and the staff. He said the Directors were very sorry to lose Mr. Lowe, who was a man of considerable ability; otherwise the Company would not be in so prosperous a state. In parting with him, they were losing a good Manager and friend; and they desired to show their gratitude to him. They hoped the remainder of his days would be happily spent, and the evening of his life be useful and pleasant. Mr. Lowe, who spoke with considerable emotion, thanked the Chairman for his kind remarks. He said it was to him a matter of great regret to have to sever his connection with the Company; but he felt that a concern of this magnitude should be in the hands of a younger man than himself. The choice of his successor would, he thought, prove in every way satisfactory; and he believed that the prosperity of the concern would go on in the future as it had done in the past.

Water.

Steady Progress at Leatherhead.

At the recent half-yearly meeting of the Leatherhead Water Company, the Directors reported a profit of £1497, and a sum of £2602 available for distribution; and they recommended a dividend at the rate of 6½ per cent. per annum, which would absorb £1252, and leave a balance of £1350 to be carried forward. The Company's Engineer (Mr. F. Southwell Cripps) announced that the water supply during the six months covered by the report had been satisfactory in quantity and quality. The plant and machinery had been maintained in good order, and the sum allowed for depreciation was, in his opinion, adequate. About 2300 yards of new mains had been laid; and the increase in the demand for water would necessitate an early addition to the pumping machinery. It was about six years ago since the last pumping-engine was erected, and during that period the output of water had nearly doubled. The Chairman, in moving the adoption of the report, said the result of the half-year's working was a profit of £166 over that obtained in the corresponding period of last year; while the water-rental was £327 in excess of that in the corresponding period of 1903. This was considered very satisfactory. Looking back over the past seven years, on only two occasions had the amount carried forward been drawn upon in the shape of dividend; while the total had steadily increased. This item was now £1350, after declaring a dividend of 6½ per cent.; and it must be very satisfactory to the shareholders. The report was adopted.

Nearing Perfection at Maidstone.

The Maidstone Water Company have lived down the ill-feeling aroused towards them a few years ago in consequence of the serious outbreak of typhoid fever with which the town was visited, and are pursuing a steady course towards the perfection of their supply. At the half-yearly meeting a few days ago, the Chairman (Mr. H. W. Tyrwhitt Drake) told the shareholders that Professor Sims Woodhead had expressed entire satisfaction with the whole system of the Company; while Mr. Gregory, the Chemical Analyst, had presented very gratifying reports. He alluded to another cause for congratulation—viz., that they had procured the approbation of Mr. Bryan, the Chief Engineer of the Metropolitan Water Board, in connection with the new reservoirs for the supply of the higher parts of the town. He had gone through the works, and had pronounced everything perfectly satisfactory. When they were completed, the Company's system would be as perfect as they could wish to have it. They would not only be able to supply every place within their area, but every portion of the works (which are under the supervision of Mr. W. J. Ware, the Engineer and Manager) would be duplicated. Mr. Morling supplemented the Chairman's remarks as to the quality of the water with the statement that the Medical Officer of Health to the Corporation had the previous day submitted to a meeting of the Sanitary Authority his report upon the purity of the water supply. He had visited all the gathering-grounds of the Company, with an eminently satisfactory result. The Accountant (Mr. Wood) gave a *résumé* of the financial statement; and said that, as an outsider, he thought it most satisfactory. The sum standing to the credit of the profit and loss account was £7165; and dividends at the rates of 7½ and 5¼ per cent. per annum on the 10 and 7 per cent. shares were declared. The payment of these absorbed £1680; leaving £5485 to be carried forward.

The Burden of Rates in South Staffordshire.

Presiding at the half yearly meeting of the South Staffordshire Water Company on Thursday, Mr. Frank James, in moving the adoption of the report (noticed last week), said that during the half year £9296 had been expended upon works generally; the principal portion going in new stations in course of erection. More than 8 miles of additional mains had been laid during the same period, besides 500 yards of new mains which had replaced old ones. To a Company like their own, the rate question was an ever-growing one; and during the present half year the proprietors would see that the rates had increased by something like £600. Their undertaking was badly situated in this respect, inasmuch as their pipes extended through ten different unions where they were rated, and they were also subject to the rating of 59 parishes. Out of every pound they received for water, they paid nearly 2s. in rates; that was to say, over 9½ per cent. of their receipts for water was expended in rates. At the commencement of last session, he thought the introduction of the Valuation Bill might relieve them to some extent—not, perhaps, in reducing their own assessments, but in bringing up everybody else's to a proper rateable level with their own. Assessment Committees put the rates upon companies such as theirs as heavily as possible; but it would be very invidious for them to appear before the Committee and complain that they were relatively unfairly rated. If the Valuation Bill resulted in having one assessment, so that everybody was upon the same level, there would be no cause for complaint. During the past half year, trade had been bad, and there had been a diminution in the receipts from water for commercial purposes. The consumption for domestic use, however, showed an increase. Sir Henry Wiggin seconded the motion, and it was carried.

FATAL GAS POISONING IN BELFAST.

The Deputy-Coroner for Belfast (Mr. J. S. Finnigan) held an inquest, in the Royal Victoria Hospital, on Monday last week, relative to the death of Hugh M'Mahon, aged 34 years, a workman in the employ of the Corporation. Mr. Spiller appeared on behalf of that body; Mr. W. Tughan represented the next-of-kin of deceased. Thomas Boyd stated that he was foreman of the Gas Department. On the previous Saturday, the Manager told him to do a job in College Green. Deceased and another man accompanied him; and their duty was to put in a service-pipe from the main to one of the houses. They all removed the flags, when witness sent the other man for piping, and left himself for the gas office. He instructed M'Mahon to open the ground to the house until they came back. A hole 2 feet deep had to be dug to reach the pipe. On returning, he found the deceased in the hole in a crouching attitude and unconscious. He was lifted out, and two doctors were summoned. The bent pipe in Court was attached to the main at the place. There was a hole at the bend, from which the gas must have been escaping in large volumes—sufficient to suffocate a dozen men. Deceased had apparently been cutting off the pipe. There were no plugs at different districts in the city where gas could be turned off when work of this description was being done. In reply to Mr. Spiller, witness said it was not deceased's business to interfere with the piping at all, as that was the foreman's work. He could have stopped the leakage by putting clay over the hole. John M'Chrystall deposed that he had heard the foreman telling the deceased to open the ground, and not to interfere with the piping. Mr. A. Purdy said it was not part of a labourer's duty to touch the pipes. Mr. James Stelfox, the Corporation Gas Engineer, said that there were no stop-pressures or plugs in the district to turn off the supply. If there were, the whole district would be affected when the gas was cut off. Dr. Fielden and Dr. Blakeley deposed that death was due to coma following gas poisoning; and the Jury returned a verdict in accordance with the medical evidence—attaching no blame to anyone.

NOVEL MEANS OF INCREASING GAS OUTPUT.

The "American Gaslight Journal" for the 15th inst. contains the following communication by Mr. P. Eves, of Paterson (N.J.), under the above heading.

The Milwaukee Gas Company are to be congratulated on having opened a cooking school for their staff of canvassers. I speak from actual experience. To teach gas consumers how to use gas intelligently and economically is one of the best policies that a gas company can adopt. We have proved it to be one of the principal elements of success, and to account, in a remarkable degree, not only for a material addition in the output of gas, but for a decided diminution in the work of the complaint department. "A satisfied and contented customer is a gas company's best asset." To teach the canvassers how to use gas and how to manipulate the gas-range properly, is one of the best means of securing the instruction of the company's new patrons. But "a little knowledge is a dangerous thing;" and therefore the lessons, especially to the staff of salesmen, should be comprehensive and thorough; giving special attention to the elementary, but most important, items of the

management of the burners, heating the ovens, and securing the greatest economy in preparing a meal. Paterson has met with success in its output of gas-ranges and in securing new business. We have probably struck the key-note of this success in stating our belief and our practice in educating the public in the proper use of gas. A few "gas tips" from our experience may be generally acceptable; and if some of the ideas mentioned be perhaps novel and unprecedented, they are excusable on the ground that they have been productive of popular benefits to the gas consumers themselves, and of a considerable addition of new gas business.

A little more than three years ago, we decided to educate our canvassers in the use of the gas-range. The lady demonstrator engaged for this work was requested to give prominence, not so much to the attractiveness of novel *menus* as to the fundamental science of domestic economy and of ordinary household cooking. These instructions were followed up by a second series of lessons, by another able lady demonstrator; and the men, thus equipped with a fund of valuable knowledge and ideas, met with welcome in the homes, and with a marked increase in the number of orders booked. In this connection, we resolved to follow up every gas-stove sale and to put the delighted purchaser on the right track at the very beginning of her new cooking experiments. One of our canvasser students, taking a deep interest in this work, became an expert cook and an authority on all matters pertaining to the gas-range. We had thus gained another advantage and secured our own demonstrator. We have used his expert services in imparting instruction and advice to the other and newer salesmen. He has dealt successfully with all our stove difficulties, and secured the use of the broiling-oven where otherwise it would not have been used at all, or very seldom. He has made popular in this city home-baked bread, biscuits, muffins, and other home necessities, and in many cases caused gas-ranges to be the only cooking appliances used.

Realizing the value of thus training gas consumers, we sought a more wholesale method of dealing with the question, and found it. We wrote to the ecclesiastical head of every church throughout the city, offering the services of our home-made demonstrator to give a practical cooking demonstration to the ladies of the respective congregations, or to any educational classes or societies in connection with the church. The churches gladly fell in with the idea, and the history of these demonstrations is a history of public gratitude and of business growth. In a population of a little more than 100,000, we thus reached a large proportion of gas consumers and others on the lines of the mains, and sold, in one week alone, nearly three car loads of gas-ranges. The attendance at these church demonstrations sometimes reached the extraordinary number of 175 to 200, and we record in our report the unique fact that in one instance the public of the parish were invited to attend our cooking lecture by the ringing of the church bell for half-an-hour. Our canvassers attended in the double capacity of ushers and salesmen, booked a number of sales on the spot, received requests to call at a later date, and dealt with difficulties and complaints—thus finding a productive field for new business and for our work. The advertising accomplished by the effort was incalculable. Notices were given out from the pulpit on successive Sundays, and the announcements to the congregations were disseminated by the people throughout the various parishes; thus bringing the question of the gas-range before the public in an extraordinarily successful and wholesale manner. The subsequent canvass in the influenced territories resulted in "breaking all previous records" for sales, not only of gas-ranges, but of all kinds of domestic appliances. The Press commented favourably upon our work, and, seeing the popularity of the demonstrations and the friendliness of the churches, gave the Company support in advocative newspaper paragraphs.

We have made arrangements to continue and to repeat these demonstrations through the autumn and winter, and, in connection with the second series, to have an exhibit of lighting appliances and a model meter-dial as affording a means of illustrating the best and the proper use of gas as an illuminant as well as a fuel, and of teaching the reading of the meter. Knowing now that these meetings are so beneficial and popular, that they are welcomed by the authorities of the churches, and attended by large numbers of gas consumers as well as non-consumers, it is almost surprising that such a productive field has not hitherto been more generally cultivated. We are of the opinion, however, that the gas companies interested in securing a crop of contented clients, in adding new customers to their ledgers, and in recording a larger number than ever of gas-stove sales, will do well to consider the advisability of adopting or developing this popular, productive, inexpensive work.

THE TOTTENHAM AND EDMONTON GAS-WORKS AS THEY WERE

In the Days of Alex. Angus Croll.

A document, faded and soiled with age, has been discovered among the papers of the late Mr. Thomas Glover; and it connects up with the present a long past day in the gas supply of Tottenham and Edmonton. The date of the paper is probably about 1846; and it describes the gas-works as they then existed. At that time they were in the possession of the celebrated Mr. Alexander Angus Croll; and it is surmised that the document is in the handwriting of Mr. Croll himself. It will be seen that in it the formation of the Company is foreshadowed. However, the historical paper was the subject of reference by Mr. Corbet Woodall at the meeting of the Company last Thursday; and in that connection, and as forming a companion picture to the one we gave in December last of the works as they now stand, we reproduce the contents.

TOTTENHAM AND EDMONTON GAS-WORKS.

(*Pharos Lane, Marsh Lane.*)

These works stand upon nearly two acres of freehold land; are bounded on the South by Eastern Counties Railway, and on the West and North by Willoughby and Dyson's Lanes.

They consist of a retort-house, 50 feet long by 40 feet broad, side walls 19 feet high, capable of containing 60 retorts. There are at present erected ovens for 40 retorts; one-half of which are filled, and in working order. Coal-store, within 20 yards of the railway, capable of containing a winter's stock, with gas-fitters' shop attached. Purifying-house, containing two sets of double purifiers, two saturators, an exhauster, and 2-horse steam-engine. Lime-room, likewise containing the steam-boiler. Ammonia room, with necessary apparatus for making sulphate of ammonia. Store-room, and blacksmith's shop; two gasholders, each 32 feet diameter by 17 feet deep, in cast-iron tanks. Condenser. Tar-well, sufficient to hold six months' stock. Two-stall stable and coach-house, with hay-loft above. Bath-room, with cold and warm baths and necessary fittings. Greenhouse, stocked with plants. Superintendent's residence, consisting of a two-storey four-roomed house, with kitchen and other offices. Counting-house for two large rooms with water-closet attached. Main pipes: 3310 yards of 2 inches diameter; 5615 yards of 3 inches; 36 yards of 4 inches; 153 yards of 5 inches; 5032 yards of 6 inches; 1016 yards of 7 inches; and 2030 yards of service-pipes—making a total of nearly ten miles in length.

The above are at present the property and in possession of A. A. Croll, by whom they were erected, and intended by him as a permanent investment, and were on that account built of the best materials in the most substantial manner, and in strict accordance with the Building Act.

There are two main pipes leaving the works—one proceeding along Willoughby and Marsh Lanes, the other going up Dyson's and Water Lanes.

A direct communication between the united villages of Tottenham and Edmonton could have been formed by going up Waggon-and-Horses Lane, and at one-third the expense; but the route taken was considered best from the fact that it thus embraces the coach road leading to the two stations of railway—Marsh Lane and Edmonton—both of which will in all probability be built upon in a short time.

The works are supplied by an artesian spring, which flows to the height of 8 feet, and is carried in pipes all over the works, so that no manual labour in pumping is required.

The whole of the spare land is in a good state of cultivation, and tastefully laid out in grass lawns, flower plots, and gardens—to be appropriated to the further extension of the works. A beautiful fountain and pond stands opposite the Superintendent's house, and fronting the gate of the works. This is supplied with a constant stream of water from the artesian spring.

It is proposed to form a Company for the purchase and carrying on of the above works, with a nominal capital of twenty thousand pounds (£20,000) in one thousand shares of twenty pounds each—one hundred of such shares to be reserved to A. A. Croll.

The Company to pay A. A. Croll, on their taking possession of the works, the sum of , the remainder of the purchase-money to depend upon the amount of profit realized the first twelve months of the Company's proceedings, and to be calculated upon the following principle—viz., the whole of the expenditure included in the following items: Coals, wages, salaries, lime, wear and tear of retorts, taxes, general expenses, ½ per cent. for bad debts, acid, deterioration fund 1 per cent., gas-fittings purchased. The above to be deducted from the gross income by gas, coke, breeze, tar, ammonia, gas-fittings, and old materials; and for every sixty pounds of profit shown by the balancing of these accounts, the Company to pay to A. A. Croll the sum of 1000 pounds, or, in other words, that the Company shall have secured to them 6 per cent. upon the amount to be paid for the works.

If this amount is secured to the Company for the first year, it is fair to presume that it will go on increasing every year, for two reasons. The villages of Tottenham and Edmonton, previous to the erection of these works, were never properly attended to as to lighting; and, in consequence, there is a general desire for gas including the private dwellings of the most respectable inhabitants, and as the works are sufficiently large to allow a double extension of the present demand, no investment will be required for a considerable length of time.

TIVERTON AND THE ELECTRIC LIGHT.

Opposition by Ratepayers.

The Tiverton and District Mercantile Association recently had a meeting "to consider the advisability of opposing the electric lighting loan" applied for by the Town Council. Mr. J. C. Salter presided over a large attendance, and strongly objected to the installation of the electric light, in direct opposition to the wishes of the large majority of the ratepayers. He advised that the light should be left to some outside firm, and that the Council should direct their energies to making the gas-works pay better. They were going to borrow £13,000 to hand over to a firm of electricians, but how much would the plant be worth at the end of the three years' term? At the present rate of progress in electrical matters, it might be valueless. It was practically certain that a great deal more money would be required at the end of the term, when the Council took over the works. Besides, several costly municipal schemes were to be provided for in the near future. In face of these facts, he thought it would be suicidal for the Council to instal the light when building and business generally was at a standstill in the town, and the population at the last census showed a decrease of 500. Mr. H. Thorne said a rough canvass of the traders of the town on the matter had been taken. Two questions were put before them: (1) Are you willing that the Town Council should borrow £13,000 for electric lighting? (2) Have you already promised to take the current on the Council's terms? To the first question there were three "Yes" and 107 "No;" and to the second nine "Yes" and 100 "No." There were many others against the scheme who had not signed the papers. The Chairman explained that only the principal traders were canvassed. Had the whole town been approached, the result would have been overwhelming. Mr. C. H. Nott referred to a circular issued by the firm to whom the Council were going to give the

contract for the installation, and in which they made a comparison between the cost and power of electric light and gas. It was, however, based on the capacity of a gas-burner fifty years old. An incandescent burner could be taken to burn 4 cubic feet of gas per hour, and it gave the same candle power for 2d. as electric lamps would give for 5½d. Mr. Sanders said he had had experience of both gas and electricity, and he considered the latter cost four times as much as the former, and only gave half the light. Mr. Burnstone moved—"That this meeting give their Committee power to engage a legal gentleman to oppose the loan for electric lighting on behalf of the Association, the expense to be paid out of the funds." The motion was carried.

On Tuesday, Mr. H. Ross Hooper, M.Inst.C.E., conducted an inquiry into the above-mentioned matter on behalf of the Local Government Board, and the Mercantile Association, represented by Mr. H. J. Carpenter, opposed the application. It was explained by the Town Clerk (Mr. C. M. Hole) that the question of providing the electric light had been under consideration for several years. Originally, it was proposed to use water power for generating the current; but they found such difficulties in regard to the Board of Trade regulations respecting a fish-pass and other matters, that they had to abandon the scheme. They finally decided upon the site now proposed, which was near the railway station; and they hoped to secure the Railway Company as a customer. The Council had entered into a contract with Messrs. F. Suter and Co. to carry on the works for three years, and the net profit was estimated at £623 per annum. Mr. J. Siddalls, Borough Surveyor, and Mr. J. S. Enright, Electrical Engineer, gave evidence in support of the scheme. Mr. Carpenter pointed out that the town was heavily rated; the amount being 6s. 8d. in the pound, against an average of 4s. 11d. for the whole of England; while the population was decreasing and the rents were declining. For these reasons, the Association was doing its best to prevent the Town Council incurring heavy liabilities on a purely speculative business. The matter had twice been laid before the ratepayers, and on both occasions disapproval of the Council's scheme had been expressed. In the Council itself it had been carried by a majority of only one. The traders in the town had been canvassed by the Association, and it was found that 160 were against the scheme, 11 in its favour, and 67 were neutral or absent from home. It was the view of the Association that by establishing the electric light the Corporation would damage the interests of the gas undertaking, which was a comparatively new venture for the Corporation, and one which would not benefit by this opposition. Mr. Siddalls said the Corporation canvass of the residents showed that 37 of the largest consumers were ready to take the light. In reply to Mr. Carpenter, he said he could not guarantee that the undertaking would be a success. Alderman J. Thorne, supporting the scheme, criticized the methods adopted by the Association, of which he is Chairman, and expressed his own opinion that there is a good opening for the electric light without material damage to the gas undertaking. The Inspector put a number of questions regarding the gas-works, and was informed that, with the exception of two years, the undertaking had shown a profit every year since the Corporation acquired it in 1898. The Inspector said he thought the Corporation might find, with regard to the electricity works, that it would be a case of robbing Peter to pay Paul. The inquiry then closed.

FIRE OFFICE REGULATIONS FOR LIGHTING BY GAS.

The Associated Fire Offices have lately issued the following revised rules to be observed in connection with apparatus for generating, compressing, &c., gas (including acetylene gas and oil gas) for lighting purposes:—

Every apparatus, except as below, for generating, purifying, enriching, compressing, or storing gas, must be either in the open or in a building used for such purposes only, not communicating directly or indirectly with any building otherwise occupied.

An acetylene gas portable apparatus is allowed, provided it holds a charge of not more than 2 lbs. of carbide. Liquid acetylene must not be used or stored on the premises.

A coal gas compressing apparatus having a capacity not exceeding 5 cubic feet is allowed, if in a separate compartment.

Every gas-light exceeding 175-candle power must have a metal heat-deflecting shield at least 10 inches in diameter fixed above the lamp. The shield must not be within 12 inches of a non-fireproof ceiling; and if the ceiling is at a distance of less than 2 feet from the shield, and is not either fireproof or ceiled with plaster, it must be protected with sheet asbestos at least 30 inches in diameter. [For the purpose of this last provision, the exposed under-side of any beam, joist, or floor shall be deemed the "ceiling."]

The pipe, whether flexible or not, connecting an incandescent gas-lamp to the gas supply, must be of metal, with metal connections.

Incandescent gas-lights in textile mills, flour-mills, and oil-mills must not be fitted with ordinary pilot-lights or bye-passes.

GAS v. ELECTRICITY FOR WORKHOUSES.

At the Meeting last Thursday of the Ormskirk Board of Guardians—Mr. S. Brighouse presiding—the question of the proposed installation of electricity for the Workhouse was discussed. Mr. Alty moved that the sanction of the Board be given to the execution of the works, at a sum of £4750. A letter from Mr. W. B. Cownie, the Manager and Secretary of the Electric Light Company with whom negotiations had been going on, was read, stating that the Company could supply the Workhouse with current at 4d. per unit for lighting purposes, which would save upwards of 20 per cent. on the cost of production by the

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
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CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.

AND, IN ADDITION, 4,000,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

Guardians themselves. The Ormskirk Gaslight Company wrote offering a free demonstration that they could supply incandescent light at less cost than could be obtained by electricity. Mr. Wood (Southport) pointed out that the gas account was £225 for last year, and he could hardly say the Board had adopted the best method of lighting with gas. They had 20 incandescent burners, and 180 of the old-fashioned burners. In his opinion they would save £60 per quarter if they used new incandescent burners. He understood the renewal of arc lamps was far greater than that of incandescent burners; and whatever had been the attitude of the Gas Company in the past, he believed the Board would be able to secure preferential terms to the extent of at least 5 per cent. The cost of installing the electric light would be not far short of £4000. It had been demonstrated in Southport that the electric light was a burdensome luxury. He was intending to take out electricity, and put in gas again in his premises. Other tradesmen were contemplating a similar course; and the Southport Conservative and Liberal Clubs, who at great cost had put in electric installations, were going back to gas. In view of all this, he could not allow his name to be associated with any scheme of electric lighting for the Workhouse. Mr. Holland thought gas was right, and all that had been said in support of electricity was very doubtful. It meant increased cost, and this was not the time to add to their debts, which were already £17,000 to £18,000. Eventually the matter was deferred till after a conference had been held between the various Committees concerned and the representatives of the Companies competing for the lighting.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Gas supply by a Co-operative Society is not a common experience—in fact, I do not know of any such state of affairs existing anywhere. It, however, bids fair to become a partially accomplished fact in Fifeshire. I have mentioned already that an effort is being made to provide means of lighting for the district of Kelty, a populous mining centre which is as yet in primeval darkness. In the adjoining district of Cowdenbeath, there is a Gas Company, reconstructed a few years ago; and that body, with the vigour of youth upon them, have been casting hungry eyes towards Kelty, as a likely place in which to extend their business. Proposals have been made, and terms indicated, upon which a supply of gas would be given. But a feeling has arisen in Kelty that they ought to have gas-works of their own. I mentioned two or three weeks ago that the Cowdenbeath Company's proposals were before the District Committee of the County Council, and that consideration of them was delayed in consequence of an offer which emanated from Mr. C. Carlow, the Managing-Director of the Fife Coal Company, to assist any local effort which might be made. The local effort is being made; and it has fallen, altogether unusually, but not unnaturally, into the hands of the Kelty Co-operative Society. In places like Kelty, co-operation is universal. There is scarcely a family who are not in the Co-operative Society. Consequently, the organization is in existence, and the capital too, for any enterprise which may be undertaken. The proposal is that the Society should subscribe one-half of the capital for the provision of gas-works, and the Fife Coal Company the other half. A meeting of the Society was held the other day to consider the proposal from their point of view. The Chairman said he had the assurance that the Fife Coal Company would subscribe half of the capital, if they subscribed the other half. He did not think it would be advisable for either of them to go in for works single-handed; but if it were made a joint concern, the success of the scheme would be assured. The terms of the Cowdenbeath Gas Company's proposal were explained to the meeting. This was objected to as being totally inadequate, in respect that it did not provide for a sufficient number of lamps. One of the speakers said they ought to take up the matter themselves, make the gas as cheaply as possible, and arrange that not more than 5 per cent. dividend be paid. They never could have a better chance. There was a monopoly there at present; and the Cowdenbeath Gas Company were fighting for it. Another speaker did not understand why there should be animosity towards the Cowdenbeath Company. He thought the easiest and the cheapest way would be to allow the Cowdenbeath Company to lay a pipe to Kelty. This view was not supported; but a proposal that the Society advance an equal amount with the Fife Coal Company, to erect gas-works, and that all householders be allowed to become shareholders was unanimously adopted. Thus this meeting may be said to be the somewhat peculiar inception of a new gas company.

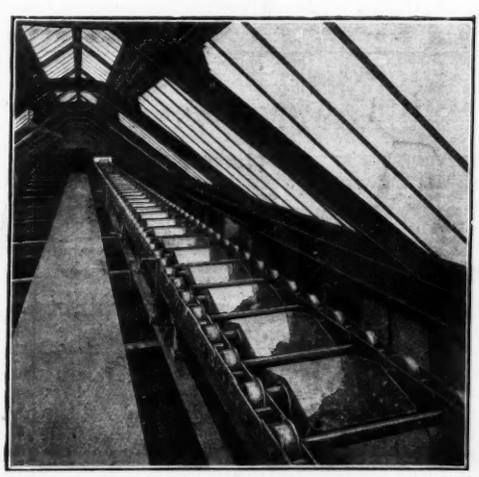
In furtherance of the proposal to form a special lighting district at Waterton, Aberdeen, the Aberdeen District Committee of the County Council had before them, at their last meeting, a requisition from the Parish Council of Newhills, asking that the district be formed, and reporting that they had been in communication with the Town Council of Aberdeen upon the subject of a supply of gas. The Parish Council stated that the Gas Committee of the Aberdeen Town Council had received a report from their Engineer (Mr. S. Milne) to the effect that, if 60 public lamps were erected, the annual consumption of gas would be about 330,000 cubic feet, and the annual charge £46 15s. The Gas Committee recommended that a supply of gas be given, and that they should erect the lamps, the cost to be refunded by the County Council. The Clerk of the District Committee stated that the cost of erecting the lamps would be about £150, and that, with the charge for gas, an assessment of 2d. per pound would be required, one-half of which would be borne by owners, and the other half by occupiers. It was moved that the request of the Parish Council be acceded to, and that the necessary steps be taken to form a special lighting district. In all such cases, we may expect that electric lighting will be dragged in. It was so on this occasion; but it was promptly pointed out that a supply of gas could be obtained at a more reasonable figure. The motion was

One of Three Conveyors in a London Power House.

Two similar Conveyors on order for London County Council.

Suitable for Handling Coke.

4 Installations in Hand.



Several Plants just Erected Abroad.

NEW CONVEYOR CO., LTD.,

SMETHWICK.

agreed to; and a local Sub-Committee was empowered to complete the arrangements.

The Lighting Committee of the Aberdeen Town Council this week adjusted their estimate for the current year. It was reported to them that during the past year their estimate was exceeded by £782, of which £500 was for gas and £282 for electric current. It was also reported that during the year 702 street lamps had been transformed from ordinary to incandescent burners, making the total number of incandescent lamps 1611. During the twelve months 123 new lamps were erected. The estimate for the current year was fixed at £13,098.

Another instance of Scotch indifference to the International Gas Exhibition which is to be held in London has cropped up at Perth. At a meeting of the Gas Committee of the Corporation on Monday, a communication from the Directors of the Exhibition was read, asking the loan of any antique gas-brackets or other articles of antiquity connected with gas. The report I have seen of the meeting states that "Perth not possessing any such articles, Councillor Ritchie humorously suggested that they might send some ex-Gas Conveners to represent Perth, along with a quantity of gas bills." This sally, it is said, provoked much laughter. It is both cruel and silly; but it represents the feeling which is entertained on this side of the Border towards the exhibition. It is a pity that the exhibition should be boycotted in this way. I can understand the refusal of contributions in money; but appliances in use in the early days of gas lighting are always of interest, and the lending of them would cost nothing. Therefore the application for them should not be treated with ridicule.

A special meeting of the Buckhaven Town Council was held on Tuesday, at which a letter from the Wemyss Gas Company was read, complaining that the Council had begun to light the all-night lamps without consulting them, and demanding payment of 19s. 6d. as meter-rents, failing which the lamps would be discontinued. One of the councillors expressed himself in favour of fighting the Company, and asserted that some gentlemen were considering the formation of a Gas Company for Buckhaven. Another thought it was a shame to treat the Company in this manner, seeing that they gave them gas for the public lamps at 2s. 6d. per 1000 cubic feet, which was really cost price. The subject, which is an all-absorbing one in the burgh, was delayed for consideration.

On Wednesday evening, shortly after 7 o'clock, an explosion of gas in the electric lighting culverts took place at the junction of Tay Street and Nethergate, Dundee. Two manholes and several slabs of pavement were thrown to a height of about 20 feet, and the footway was torn up for a similar distance. No further damage was done; and though a number of people were in the vicinity, no one was injured.

The Water Committee of the Glasgow Corporation have had before them a request by the Landlords' Association that water-mains should be laid on both sides of streets. The reason for this request is that considerable expense is caused to landlords where the mains are only on one side, especially where there are tramways. The expense which is complained of is, I understand, chiefly the cost of making up the surface of the streets after they have been lifted for repairs. Mr. Sutherland, the Water Engineer, reported to the Committee that to carry out the proposals of the landlords would cost about £90,000. Evidently he did not deal with the question of how the new lines of mains would affect electrolysis. The Committee delayed the subject for further consideration; and the Town Council last week approved of that being done. Only one councillor spoke upon the question; and his remarks were in the form of a plea that the matter, in view of the constantly growing burden upon the ratepayers, should be given special consideration to. He was manifestly against the idea of the landlords escaping their burdens at the expense of the general ratepayers.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 27.

Sulphate of Ammonia.

The market in sulphate of ammonia has been somewhat irregular; for whereas second-hand sales are reported at a decline, all parcels offered by makers have met with a ready sale at slightly hardening prices. The closing quotations are £11 13s. 9d. per ton f.o.b. Hull and £11 15s. to £11 17s. 6d. per ton f.o.b. Leith and Liverpool. For near months, makers quote £12 to £12 2s. 6d. per ton; but so far buyers hesitate about paying the premium, there being still speculative sellers abroad for delivery up to the end of the year at about the parity of spot prices. For next year, nothing further has been reported, the firmness of makers precluding business, and speculators being shy about taking liberties with the market.

Nitrate of Soda.

Notwithstanding the quiet market in the forward position of nitrate of soda, spot prices remain firm at 10s. and 10s. 3d. per cwt., for ordinary and refined qualities respectively.

LONDON, *Aug.* 27.

Tar Products.

There is very little business to advise, and, as a rule, prices have rather a downward tendency. Pitch is certainly weaker, although there are still inquiries for forward delivery. Some business appears to have been done in Yorkshire, but at low prices; makers in some instances having decided to sell for forward delivery having secured their tar. In the Lancashire district also there is a good deal offering. Makers generally appear to be selling their make as produced, and they are doubtless influenced to do so by having secured the bulk of their tar on the sliding-scale. Business has been done in Swansea at very low prices for forward delivery, and it is reported that the Scotch manufacturers have in some instances been the sellers. Quotations in Belgium also rule low; and it is reported that several sales have lately

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Midland Iron Works: DONNINGTON, near NEWPORT, SALOP.

London Office: 110, CANNON STREET, E.C.

been made at a reduction on prices ruling a week or ten days ago. The London market is also easier, although the largest distillers, as a rule, maintain their prices. Dealers are, however, accepting considerably lower figures in several instances than those quoted by makers. The fuel trade does not appear quite so brisk upon the Continent, the production in Belgium having fallen off, judging by the reports just issued. In the Midland district, however, prices are well maintained, and producers appear well sold for some time to come, and are realizing proportionately higher prices than in any other quarter. In benzol, business has again been done at 9d. per gallon f.o.b. London for 90 per cent., while it is reported that less than this has been accepted by makers in the North for shipment at outports. Further business in anthracene is reported in Contineutal makes for forward delivery, but at rather lower prices. One maker is reported to have accepted the equivalent of 1¾d. for 38-40 per cent. up to the end of March next year. English makers, however, remain in the same position, and there is very little offering, doubtless owing to the fact that most makers have almost entirely abandoned the production of this article. The market in solvent naphtha continues in about the same position; but there is an absence of Continental demand, and buyers for home consumption appear now to have satisfied their requirements for the time being. In carbolic acid, consumers still continue to report having made purchases at very low prices for early delivery, and decline to entertain business all over next year. Sales have certainly been made at 1s. 9d. in the Lancashire district for early shipment; but makers on the East Coast ask more than this, and do not seem to be particularly anxious to sell, doubtless, as a rule, having placed their make to the end of October. In crystals, there is really no business doing so far as the English market is concerned. If there are any orders offering, they are certainly being monopolized by the German producers. For creosote, the demand continues very good, and it is reported that large sales have taken place for export. London makers have advanced their price to 1⅜d., but in Yorkshire 1⅜d. is about the market value.

The average values during the week were: Tar, 17s. to 21s. Pitch, London, 28s. to 29s.; east coast, 27s. 6d; west coast, 25s. 6d. to 26s. Benzol, 90 per cent., 9d.; 50-90 per cent., 7d. Toluol, 6¼d. to 6⅝d. Crude naphtha, 2¾d. to 2⅝d.; solvent naphtha, 7⅛d. to 8½d.; heavy naphtha, 9½d. to 10½d. Creosote, London, 1⅝d. to 1 11/16d.; North, 1⅜d. Heavy oils, 2d. to 2¼d. Carbolic acid, 60 per cent., 1s. 9d. to 1s. 9¼d. Refined naphthalene, £4 10s. to £8; salts, 21s. to 22s. 6d. Anthracene, "A" quality, 1¾d. to 2d.; "B" quality, 1d., nominal.

Sulphate of Ammonia.

The market is very quiet for prompt, but there is a good inquiry for forward delivery. Beckton still quote £11 18s. 9d. for prompt delivery; but are asking £12 for October-December. The South Metropolitan Company will accept £12 for immediate delivery, but they ask £12 1s. 3d. for September. In Leith, business is reported at £11 15s. for prompt, and at £12 to £12 5s. for January-June next year. There is not much business at Liverpool. Prices rule from £11 13s. 9d. to £11 15s. for August-September delivery. In Hull the market is very dull. There are still sellers at £11 12s. 6d. for prompt, but buyers do not appear to take any interest in the article; while as regards forward, makers at present decline to quote.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The broken weather, with a much colder temperature, has given an impetus to the house coal trade. There has been a better demand for the finer qualities than is usual at this period of the year. On the other hand, the supplies of engine and forge coal have been quite sufficient to meet requirements without any strain upon the pits. The short time in the cotton trade is being further extended. The consumption of engine coal is therefore of a limited character. The holiday season is still a disturbing element on 'Change; and this week, besides "wakes" at a dozen Lancashire, Cheshire, and Derbyshire towns, the collieries in the Bolton, Ashton, and New Moston pits are closed temporarily while the men are away. What with short time working, and the 5 per cent. reduction, it is not surprising that in some quarters considerable distress is reported. There is very little doing in coal for export; and coke only moves away slowly. The increase in the demand for house coal causes more slack to be made; but there is not at present a corresponding demand for this class of fuel. Prices remain stationary—viz., Best house coal 13s. to 14s. per ton at the pits, seconds 11s. to 12s., and common 9s. to 9s. 6d. and 10s. Steam and forge coals are 7s. 6d. to 7s. 9d. for common, and 8s. 3d. to 8s. 6d. for the better qualities. Best slack is firm at 6s. to 6s. 6d., secondary qualities 5s. to 5s. 6d., and common 4s. to 4s. 6d.

Northern Coal Trade.

There has been a rather better demand for coal; but it is still irregular. The collieries are working more steadily; and their output is well taken up generally. In the steam coal trade, best Northumbrians are about 10s. to 10s. 3d. per ton f.o.b.; second-class steams are 8s. 9d. to 9s., and steam smalls from 3s. 9d. to 4s.—the latter kind being now very plentiful and weak. The gas coal trade is a little steadier; the demand being fuller for the large contracts, while the expansion in the home use is becoming slowly more evident. For good Durham gas coals, the price varies from 8s. to 8s. 3d. per ton f.o.b.; while second qualities are perhaps 3d. per ton or so cheaper. No contracts of moment have been settled in the last few days. In coke, the market is still steady; and gas coke maintains its price at from 13s. to 13s. 3d. per ton f.o.b. for export qualities, though there is now an increase in the output.

Scotch Coal Trade.

There is still an inflated demand for coal, in view of the possibility of trouble with the miners; but prices are not quoted any higher.

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BOILER . .
AND . . .
WATER . .
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This is somewhat singular, because speculators are busy covering their probable requirements. Complaint continues to be made by coal-owners that the prices ruling are so unremunerative that their collieries cannot be carried on with profit. The quotations are: Main 7s. to 7s. 3d. per ton f.o.b. Glasgow, ell 8s. to 9s. 3d., and splint 8s. 6d. to 9s. The shipments for the week amounted to 259,288 tons—an increase of 9821 tons upon the previous week, but a decrease of 5095 tons upon the corresponding week of last year. For the year to date, the total shipments have been 7,510,187 tons—an increase of 177,082 tons upon the corresponding period of last year.

Acetylene Lighting in Apartments.—According to the "Journal de l'Eclairage au Gaz," the Civil Tribunal of Nice has decided that a tenant occupying a flat or rooms cannot employ acetylene gas for lighting "unless a covenant in the lease authorizes him to do so."

The Heathfield Natural Gas Company.—After the many promises held out, it must have come as a shock to many people to see a "Catalogue of the Plant and Effects" on the Natural Gas Company's works near Heathfield Railway Station, which, by order of the Sheriff, were to be sold at auction by Mr. R. G. Webb, of Brighton, on Friday last. Apparently we are as far as ever from a definite settlement of the question as to whether or not large quantities of natural gas exist in Sussex; but the catalogue referred to will probably be considered by some people to constitute a sufficient answer.

English Oil Combine at Baku.—Four English oil companies operating in Russia will in future be under one management, and the arrangement is regarded by the "Petroleum World" as a combination and consolidation of British petroleum interests. Mr. Leslie Urquhart, the Manager of the Schibaieff Petroleum Company, and Resident Director in Russia of the Bibi-Eybat Petroleum Company, has been entrusted by the Directors of the Russian Petroleum Company and the Baku Russian Company with the management of their affairs at Baku. An output of nearly 100 million poods of oil per annum will therefore be under his control.

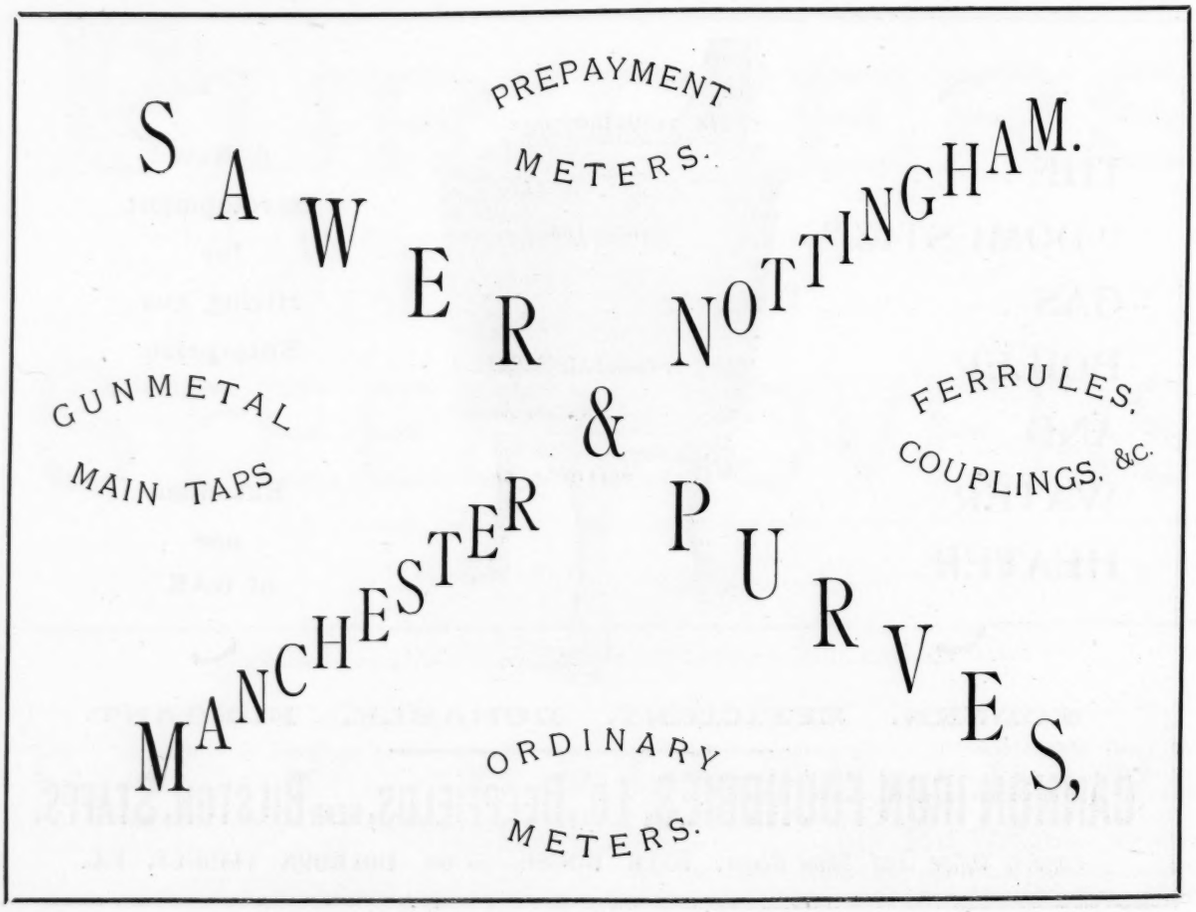
Gas Making at Preston.—An interesting article describing the process of gas making as carried on under the supervision of Mr. Henry Green at the Preston Gas-Works appeared in the "Preston Guardian" on the 20th inst. Preston was the first English provincial town to possess gas-works (these having been erected in Glover Street in 1815) and to be lighted therefrom. The old parish church was the first place of public worship so illuminated; while the cotton-mill of Messrs. Horrockses, Jacson, and Co. claimed this distinction among those industrial establishments. The price in 1816 was 15s. per 1000 cubic feet; now it is 3s. 5½d., less discounts, making the net costs 2s. 9½d. or 2s. 11½d. For permission to inspect the works for the preparation of his description, the writer acknowledges his indebtedness to Mr. Green, whose various improvements, introduced during his forty years' connection with the Gas Company, receive well-merited recognition.

Reductions in Price.—At the meeting of the Tamworth Gas Company on Thursday, it was announced that the price of gas to ordinary consumers will be reduced by 3d. per 1000 cubic feet as from Jan. 1, 1905. The Watford Gas Company have reduced their price by 2d. per 1000 cubic feet to all consumers as from the 1st of October next; bringing it down to 2s. 10d. At the half-yearly meeting of the Northwich Gas Company on Friday, it was resolved to reduce the price of gas supplied through ordinary meters by 2d. per 1000 cubic feet. On the 1st of October, the price of gas at Weymouth will be reduced 2d. per 1000 cubic feet; bringing it down to 3s. 4d.

The Petroleum Industry in Barbados.—According to a Reuter telegram sent from Barbados on the 12th inst., at the meeting of the House of Assembly on the 2nd inst., the Acting Attorney-General laid on the table a message from His Excellency the Governor with reference to the oilfields in Barbados, in which he stated that the attention of the Imperial Government had been drawn to these fields as a possible source of supply of oil for Imperial uses, and that a Bill would be brought forward for the consideration of the House, by which the Imperial Government would obtain the necessary control over the disposal of any oil when obtained. This Bill would not interfere with any mining rights possessed by the West Indian Petroleum Company, from whom the Government would take any oil residues the Company could supply them with. The object of the Bill was to give the Government control over any oil obtained, so that it should not be injudiciously forced or put upon the market, and that all oil required for Imperial purposes should be refined locally. The Bill is receiving the consideration of the House.

Effect of the Abolition of Stove-Rental at Oldham.—"The Oldham Corporation evidently acted wisely," says the writer of one of the "Town and District Notes" in the "Oldham Chronicle," "in abolishing the quarterly rental-charge for gas cooking-stoves. Since the change was announced, no less than 644 cookers have been rented from the Corporation, 280 within the past fortnight. Such an impetus to the use of gas ought to well reward the Gas Committee for their enterprise. The increase is the more satisfactory as winter is approaching, when to an appreciable extent the necessity for fires renders the call upon the cookers less. There can be no doubt about the convenience of these articles in the summer months; and they come in very useful even in winter for the busy housewife. The Corporation probably believe in the application of the motto to them 'Once used always used.' A rent-charge of 2s. 6d. per quarter seems to have discouraged their use to a certain extent; but now that the cost will depend altogether upon the needs of the household, and there is no charge for fitting up, a 'boom' has set in."

The Mearns Gaslight Company was registered in Edinburgh last week, for the supply of gas for lighting and heating in the town of Mearns, Forfarshire, and the neighbourhood. The capital is £1000, in £1 shares. The public are not invited to subscribe.



Messrs. Robert Dempster and Sons, Limited, of Elland, are erecting a 68 feet diameter single-lift gasholder, in an existing cast-iron tank, at the Luddendenfoot Gas-Works, for the Sowerby Bridge Urban District Council.

Messrs. Meldrum Bros. have received from the Municipality of Johannesburg an order to duplicate the destructor plant erected by them, and known as the Burghersdorp destructor. The existing plant comprises one four-grate Meldrum "Simplex" regenerating destructor, top-feed type, the combustion chamber being arranged centrally; one Babcock and Wilcox boiler, having 1966 square feet of heating surface; and the whole of the necessary fire-brick material, as well as the ironwork for buildings and all destructor accessories.

We understand that Messrs. S. Cutler and Sons have received instructions from the Leamington Priors Gas Company to fit one of their 20 ft. by 20 ft. by 5 ft. purifiers to the Jäger system.

Mr. A. Gillespie, Consulting Engineer, of Glasgow, has assumed as his partner his son, Mr. John Gillespie; and the business will in future be conducted under the name of A. Gillespie and Son.

An Association has been formed, to be known as the British Weights and Measures Association, having for its objects the defence, standardizing, and simplifying of British weights and measures. The Association will oppose the enforcement of the metric standard as a British one, and it proposes eventually to introduce simplified and scientifically related weights and measures based on existing British measures.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 596.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
530,000	10	Apl. 14	10½	Alliance & Dublin 10 p.c.	19½–20½	..	5 2 5
100,000	10	,,	7½	Do. 7 p.c.	13–14	..	5 7 2
200,000	5	May 12	6½	Bombay, Ltd. . . .	6–6½	..	5 4 0
140,000	5	,,	6½	Do. New, £4 paid	4⅜–5⅛	..	4 18 11
50,000	10	Mar. 10	14	Bourne-) 10 p.c. .	29–30	..	4 13 4
251,810	10	,,	7	mouth Gas) B 7 p.c. .	15–16	..	4 7 6
53,200	10	,,	6	and Water) Pref. 6 p.c.	14½–15½	..	3 17 5
380,000	Stk.	Aug. 12	12	Brentford Consolidated	235–240*	..	5 0 0
300,000	,,	,,	9	Do. New . . .	177–182*	..	4 18 10
50,000	,,	,,	5	Do. 5 p.c. Pref. .	125–130*	..	3 16 11
206,250	,,	June 10	4	Do. 4 p.c. Deb. .	102–105	..	3 16 2
220,000	Stk.	Mar. 10	11†	Brighton & Hove Orig.	212–217	..	5 1 5
246,320	,,	,,	8†	Do. A. Ord. Stk. .	150–155	..	5 3 3
460,000	20	Apl. 14	10	British	39–40	..	5 0 0
100,000	Stk.	Aug. 12	6	Bromley, Ord. 5 p.c. .	114–118*	..	5 1 9
165,700	,,	,,	4½	Do. do. 3½ p.c. .	88–93*	..	4 16 9
500,000	10	May 12	7	Buenos Ayres (New) Ltd	10¾–11¼	..	6 4 5
250,000	Stk.	June 29	4	Do. 4 p.c. Deb.	92–94	..	4 5 1
150,000	20	July 14	8½	Cagliari, Ltd. . . .	21–23	..	7 3 6
100,000	10	May 27	10	Cape Town & Dis., Ltd.	14–15	..	6 13 4
103,000	10	Apl. 28	4½	Do. 4½ p.c. Pref. .	9½–9¾	..	4 12 4
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	51–53	..	5 13 2
50,003	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk.	98–100	..	4 10 0
1,375,000	Stk.	Feb. 25	5⅛	Commercial 4 p.c. Stk.	110–114	..	4 11 3
560 003	,,	,,	5	Do. 3½ p.c. do.	106–109	..	4 11 9
450,003	,,	June 10	3	Do. 3 p.c. Deb. do.	85–87	..	3 9 0
800,020	Stk.	June 10	6	Continental Union, Ltd.	102–107	–3	5 12 2
200,000	,,	,,	7	Do. 7 p.c. Pref.	135–140	–5	5 0 0
486,090	10	July 14	11	European, Ltd. . . .	19–20	..	5 10 0
354,060	10	,,	11	Do. £7 10s. paid	13–14	..	5 17 10
15,243,200	Stk.	Aug. 12	4⅜	Gas-) 4 p.c. Ord. . .	92–94*	–1	4 13 7
2,600,000	,,	,,	3½	light) 3½ p.c. max. .	86–88*	..	3 19 7
3,799,735	,,	,,	4	and) 4 p.c. Con. Pref.	106–109*	..	3 13 5
4,193,975	,,	June 29	3	Coke) 3 p.c. Con. Deb.	87–89	..	3 7 5
258,740	Stk.	Mar. 10	5	Hastings & St. L. 3½ p.c.	92–97	..	3 5 1
70,000	10	Apl. 28	11	Hongkong & China, Ltd.	15–16	..	6 17 6
3,830,000	Stk.	May 12	10	Imperial Continental .	200–205	–1	4 17 7
473,600	Stk.	Aug. 12	3½	Do. 3½ p.c. Deb. Red.	95–98*	..	3 11 4
175,036	Stk.	Mar. 10	6	Lea Bridge Ord. 5 p.c.	114–119	..	5 0 10
561,000	Stk.	Feb. 25	10	Liverpool United A .	217–218	..	4 11 9
718,100	,,	,,	7	Do. do. B .	162–164	..	4 5 4
306,083	,,	June 29	4	Do. do. Deb. Stk.	106–108	..	3 14 1

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
75,000	5	June 29	5	Malta & Medn., Ltd. .	4½–4¾	..	5 5 3
560,000	100	Apl. 5	5	Met. of) 5 p.c. Deb.	102–105	..	4 15 3
250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	102–102	..	4 8 3
541,920	20	May 27	3½	Monte Video, Ltd. . .	9½–10½	..	6 13 4
1,515,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.	104½–104¾	..	4 5 11
405,025	Stk.	July 1	3½	Do. 3½ p.c. Deb.	92–92½	..	3 15 8
15,000	10	—	—	Nrth. Middlesex 10 p.c.	19½–20½	..	—
5,294	10	—	—	Do. 7 p.c.	13½–14½	..	—
300,030	Stk.	May 12	8	Oriental, Ltd. . . .	140–145	..	5 10 4
600,000	5	Mar. 29	7	Ottoman, Ltd. . . .	5½–6½	..	5 12 0
235,005	Stk.	—	6¼	Ply'mth & St'house 5 p.c	—	..	—
398,490	5	Apl. 28	10	Primitiva Ord. . . .	4–4½	..	11 2 2
796,980	5	July 28	5	Do. 5 p.c. Pref. .	4–4½	..	5 11 1
492,200	100	June 1	4	Do. 4 p.c. Deb. .	92–94	..	4 5 1
651,070	10	Apl. 28	7	River Plate Ord. . .	10⅝–11½	..	6 4 5
300,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	93–95	..	4 4 3
250,000	10	Mar. 29	7	San Paulo, Ltd. . . .	11–12	..	5 16 8
70,000	50	June 29	5	Do. 5 p.c. Deb. .	49–51	..	4 18 0
135,000	Stk.	Mar. 10	10	Sheffield A	237–239	..	4 3 8
209,984	,,	,,	10	Do. B	236–238	..	4 4 0
523,498	,,	,,	10	Do. C	234–236	..	4 4 9
116,106	Stk.	—	5	Shrewsbury Ord. 5 p.c.	—	..	4 10 10
70,000	10	May 27	11	South African . . .	15–16	..	6 17 6
6,250,000	Stk.	Aug. 12	5½	South Met., 4 p.c. Ord.	124–126*	..	4 7 3
1,832,700	,,	July 14	3	Do. 3 p.c. Deb. . .	87–89	..	3 7 5
575,000	Stk.	Feb. 25	5¼†	S'th Suburb'n Ord. 5 p.c.	118–123	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref. .	120–125	..	4 0 0
112,533	,,	July 14	5	Do. 5 p.c. Deb. Stk.	133–138	..	3 12 6
380,940	Stk.	May 12	5	Southampton Ord. . .	105–110	..	4 10 11
87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
120,000	Stk.	Feb. 25	6¼†	Tottenham) A. 5 p.c.	120–125	..	5 0 0
325,510	,,	,,	4¾†	and) B. 3½ p.c.	97–102	..	4 13 2
182,380	10	June 10	8	Tuscan, Ltd.	8⅛–8⅜	..	9 2 10
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	96–98	..	5 2 0
30,000	Stk.	Feb. 25	7¾†	Wands-) A 5 p.c. . .	150–155	..	5 0 0
255,636	,,	,,	6¼†	worth) B 3½ p.c. . .	120–125	..	5 0 0
50,000	,,	,,	5¼6†	and) C 3½ p.c. . .	103–108	..	5 0 7
59,416	,,	June 29	3	Putney) 3 p.c. Deb. Stk.	78–83	..	3 12 3
745,872	,,	Aug. 12	5	West Ham. 5 p.c. Ord.	95–100*	..	5 0 0
85,000	,,	June 29	5	Do. 5 p.c. Pref. .	115–120	..	4 3 4
160,000	,,	,,	4	Do. 4 p.c. Deb. Stk.	103–108	..	3 14 1

Prices marked * are Ex div. † Next dividend will be at this rate.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

MANAGER AND SECRETARY. Morpeth Gas Company. Applications by September 12.
DRAUGHTSMAN. No. 4260.
HEAD CLERK. Bridlington Gas Company. Applications by September 6.
FOREMAN PIPE LAYER. Bradford Water Department. Applications by September 6.
GAS FITTER. Redruth Gas-Works.
STOKER. Sunbury-on-Thames Gas-Works.

Plant, &c., for Sale.

HYDRAULIC MAIN AND STATION METER. Galashiels Gas-Works.
RETORT IRONWORK. Sunbury-on-Thames Gas-Works.

Plant, &c., Wanted.

AMMONIA STILL. Brotherton and Co., Leeds.

Company, &c., Meetings.

WEST KENT GAS COMPANY. Bridge House Hotel, September 5, at Three o'clock.

Stocks and Shares.

NEWPORT (I. OF W.) GAS COMPANY. September 12.
WALKER AND WALLSEND UNION GAS COMPANY. September 9.

TENDERS FOR

Benzol.

RADCLIFFE AND PILKINGTON GAS COMPANY. Tenders by September 6.

Coal.

METROPOLITAN WATER BOARD. Tenders by September 5.

Condenser.

DOWN ASYLUM. Tenders by September 2.

Gasholder.

DOWN ASYLUM. Tenders by September 2.

Oxide of Iron.

MANCHESTER GAS DEPARTMENT. Tenders by September 8.

Purifiers.

DOWN ASYLUM. Tenders by September 2.
ROTHWELL GAS DEPARTMENT. Tenders by September 8.

Retort Benches.

DOWN ASYLUM. Tenders by September 2.

Scrubber.

DOWN ASYLUM. Tenders by September 2.

Tar.

RADCLIFFE AND PILKINGTON GAS COMPANY. Tenders by September 6.

Tar Well.

DOWN ASYLUM. Tenders by September 2.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in Advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in Advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London E.C. "Volcanism, London."

SULPHURIC ACID.

SPECIALLY prepared for the Manu- facture of SULPHATE OF AMMONIA.

SPENCER, CHAPMAN, AND MESSEL, LIMITED, 86, Mark Lane, LONDON, E.C. Works: SILVERTOWN.

Telegrams: "HYDROCHLORIC, LONDON."

Telephone: 341 AVENUE.

COAL GAS TAR wanted.

BEST PRICES GIVEN.

SHARPNESS CHEMICAL COMPANY, LIMITED, Sharpness Docks, GLOS.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.

Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

COAL GAS TAR wanted.

ROBINSON BROTHERS, LIMITED. Works: WEST BROMWICH, KNOTTINGLEY, and SPONDON.

TO GAS AND WATER OFFICIALS.

MELROSE CYCLES and Slot Copper COLLECTORS. Latest Design and lowest Prices. For Cash or gradual payments. Catalogue free.

MELROSE CYCLE COMPANY, COVENTRY.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

"NUGEPE" CEMENT.

JOHN E. WILLIAMS AND CO.,

VICTORIA PAINT WORKS, MANCHESTER.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

AMMONIACAL Liquor wanted by JOHN RILEY & SONS, Hapton, near ACCRINGTON.

THE KEITH LIGHT.

OVER 1600 INSTALLATIONS IN DAILY USE.

SEE illustrated advertisement in next week's issue.

JAMES KEITH AND BLACKMAN, Co, LTD., 27, Farringdon Avenue, LONDON, E.C.

SPENT OXIDE.

THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.

Chief Office: 709, Old Kent Road, London, S.E.

Telegrams: "METROGAS, LONDON."

GAS TAR wanted.

BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS AND TRADE MARKS PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.

MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.

For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."

Largest Practice and most Up-to-Date Works in Britain.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.

REPAIRS RECEIVE PROMPT ATTENTION.

Telephones: 25 Oldham, and 2412 HOP, London.

Telegrams:—

"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd., (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.

General Manager (for England and Wales)—

CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.

London Managers—

E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.

General Manager (for Scotland)—

J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

THE Gas and Water-Works Supplies and Construction Company undertake all Gas and Water Work, Main Laying, &c. Gas and Water Works Financed and Loans Granted. Shares and Stock accepted in part payment for Work and Materials supplied. Gas-Works purchased outright.

Address, 99, CANNON STREET, LONDON, E.C.

SATURATORS.

SATURATORS always in Stock, Solid Lead Plate, or Pitch Pine Lead lined. Guarantee given. Prompt delivery. Inspection invited.

BIGGS, WALL, & Co., Hampden Saturator Works, NEW SOUTHGATE.

WANTED, immediately, an experienced GAS-FITTER.

Apply, by letter, stating Age, Experience, and Wages required, to the MANAGER, Gas-Works, Redruth, CORNWALL.

DRAUGHTSMAN wanted, leading, experienced in Elevating and Conveying Machinery. Good Salary to competent man.

Apply, stating Age, Experience, and Salary required, to No. 4260, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good Stoker, used to Regenerative Settings, Shovel Charging, Engine and Exhauster. Permanency to a good man. Wages 35s. per week, with one week's holiday a year.

Apply, with Reference, to S. BARK, Manager, Gas-Works, SUNBURY-ON-THAMES.

HEAD Clerk wanted, with a thorough knowledge of the Office Work of a small Gas Company, including keeping the Gas Ledger and Accounts, but not to collect. Age not less than 25. Salary £105.

Apply, in writing, with *copies* of Testimonials, not later than Sept. 6, to JOHN KELLY, Secretary, BRIDLINGTON GAS COMPANY.

Aug. 26, 1904.

MORPETH GASLIGHT COMPANY, LIMITED.

APPLICATIONS are invited for the position of MANAGER and SECRETARY in the above Company.

The work will include the Supervision of the Works, &c., the Reading of Consumers' Meters, the Collection of Accounts, and the Keeping of all necessary Books, &c.

A House and Garden, Coal, and Gas, will be provided.

Applicants must have a thorough knowledge of, and Experience in, Gas-Works (including Regenerative Furnaces and the Manufacture of Sulphate of Ammonia), must state Age and Salary required, and when at liberty to commence duties, and must forward their Applications, along with *copies* of not more than Three recent Testimonials, in an envelope endorsed "Gas," on or before the 12th of September, to Mr. RALPH CRAWFORD, Bank, MORPETH.

Aug. 23, 1904.

BRADFORD CORPORATION WATER-WORKS.

FOREMAN Pipe-Layer wanted, to take charge of the Pipe-Laying Department in connection with the City supply, and of the Workshops at the Pipe and Meter Depôt.

Applicants must have had Experience in Laying, Testing, and Repairing Water-Mains, Repairing of Meters, and Management of Workmen.

Salary £3 per week, with House, Coal, and Gas.

Applications, accompanied by Three recent Testimonials, addressed "Foreman Pipe-Layer," to be sent to Frederick Stevens, Esq., Town Clerk, Bradford, not later than Tuesday, the 6th of September, 1904.

By order,
JAMES WATSON, M Inst.C.E.,
Water-Works Engineer.

Water-Works Engineer's Office,
Town Hall, Bradford, Aug. 15, 1904.

OXIDE OF IRON.
(NATURAL.)

BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.

BALE'S FIRE CEMENT, PAINT, AND GAS COAL.

5, CROOKED LANE, LONDON, E.C.

AMMONIA Still (Second-Hand) wanted. Large Size.

Address BROTHERTON AND CO., LIMITED, Ammonia Distillers, LEEDS.

TAR Contracts Wanted on the Sliding- Scale or at Fixed Prices.

Managers and Secretaries desirous of selling to best advantage, please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

FOR SALE—81 feet of Steel Hydraulic MAIN, ⊃ shaped, 19-in. by 19-in., with Dip Pipes; also small STATION METER, 6-inch Connections complete with Cockey's Patent Regulating Gas-Valve.

Apply to the GAS MANAGER, GALASHIELS.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE. The whole of the Ironwork complete for three beds of six Retorts, comprising two Street Hydraulic Mains, with Valves. One Cast-Iron Ditto, Arch, Dip, and Ascension Pipes. Foul Main, Six Mouthpieces with Self-Sealing Lids, Twelve Ditto with ordinary Lids, Buckstaves, Sight Boxes, &c., &c. The whole absolutely as good as new.

Apply, S. BARK, Manager, Gas-Works, SUNBURY-ON-THAMES.

GASHOLDER, 40 ft. diameter by 14 ft. deep, in wrought Tank, with six Columns, trellis Girders, and Suspension Gear. In splendid condition. Nearly new.

New GASHOLDER, 40 ft. diameter by 12 ft. deep, with Steel Standards; also new STEEL TANK to contain same.

Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

RADCLIFFE AND PILKINGTON GAS COMPANY.

TO TAR DISTILLERS.

THE Directors of this Company invite TENDERS for the purchase of 850 Tons of the surplus TAR to be produced at their Works in Radcliffe during the ensuing Twelve Months.

Particulars may be obtained from the undersigned, to whom Tenders must be delivered not later than Tuesday, the 6th of September.

JAMES BRADDOCK,
Manager and Secretary.

Gas-Works, Radcliffe,
Aug. 26, 1904.

RADCLIFFE AND PILKINGTON GAS COMPANY.

BENZOL.

THE Directors invite Tenders for the supply of BENZOL during the ensuing Twelve Months.

Particulars may be obtained from the undersigned, by whom Tenders will be received until Tuesday, the 6th of September.

JAMES BRADDOCK,
Manager and Secretary.

Gas Offices, Radcliffe,
Aug. 27, 1904.

METROPOLITAN WATER BOARD.

TENDERS FOR COAL.

THE Metropolitan Water Board invite TENDERS for the supply of 3000 Tons of large Welsh STEAM COAL.

Forms of Tender and Contracts may be obtained on application to the undersigned, to whom sealed Tenders, endorsed "Tenders for Coal," on the prescribed Forms, must be delivered on or before the 5th of September, 1904.

A. B. PILLING,
Clerk of the Board.

Savoy Court, W.C.

DOWN DISTRICT LUNATIC ASYLUM, DOWN.

GAS RETORT-BENCHES, CONDENSER, TARWELL, SCRUBBER, PURIFIER, AND GASHOLDER.

THE Committee of Management of this Asylum are prepared to consider TENDERS for the supply and erection, including all expenses, of GAS RETORT-BENCHES, CONDENSER, TARWELL, SCRUBBER, PURIFIER, and GASHOLDER, in accordance with the Specification, which can be had on application to the Resident Medical Superintendent.

Tenders to be lodged with the Resident Medical Superintendent not later than the 2nd of September, 1904.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
SAMUEL REA,
Clerk.

Aug. 19, 1904.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

MANCHESTER CORPORATION GAS-WORKS.

OXIDE OF IRON.

THE Gas Committee are prepared to receive TENDERS for the supply of 1500 Tons of OXIDE OF IRON Purifying Material at their Gaythorn, Rochdale Road, and Bradford Road Works, during the ensuing Twelve Months (moisture not to exceed 35 per cent.).

Sealed Tenders, endorsed "Oxide of Iron," addressed to the Chairman of the Gas Committee, must be delivered at the Offices of the Gas Department, Town Hall, Manchester, not later than Ten a.m. on Thursday, the 8th of September, 1904.

WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
Aug. 26, 1904.

ROTHWELL URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE above Council invite Tenders for the supply and erection of a PURIFIER, 10 ft. by 10 ft. by 4 ft. deep, with Connections, Lifting Apparatus, &c.

Drawings and Specifications may be seen, and full Particulars obtained, at the Market House, Rothwell, Kettering, or at the Office of the Engineers, Messrs. Eunson & Son, Northampton.

Sealed Tenders, endorsed "Tender for Purifier," to be delivered to the undersigned not later than Wednesday, the 8th day of September next.

The Council do not bind themselves to accept the lowest or any Tender.

FRED MAYALL,
Deputy Clerk,

Market House, Rothwell,
Kettering, Aug. 22, 1904.

WEST KENT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Bridge House Hotel, London Bridge, on Monday, the 5th of September, at Three o'clock in the afternoon, precisely, for the purpose of receiving the Directors' Report and a statement of the Company's Accounts for the half-year ended June 30, 1904, to declare a Dividend thereon, and for General Business.

The TRANSFER BOOKS WILL BE CLOSED from the 20th of August, until after the Meeting.

By order of the Board,
ROBERT S. KEYS,
Secretary.

Office, 4, Brighton Chambers,
Denman Street, London Bridge, S.E.,
Aug. 8, 1904.

NEWPORT (ISLE OF WIGHT) GAS COMPANY.

INCORPORATED BY THE NEWPORT (ISLE OF WIGHT) GAS ACTS, 1870 AND 1901.

SALE BY TENDER OF £3000 4 PER CENT. PREFERENCE STOCK.

MINIMUM ISSUE PRICE—PAR.

THE Directors invite Tenders, at not less than par value, for £3000 4 per cent. Preference Stock authorized to be issued under the powers and provisions contained in the Newport (Isle of Wight) Gas Act, 1901.

Particulars and Conditions of issue and Forms of Tender may be obtained on application to the Secretary, at the Company's Offices, Newport (Isle of Wight), or of the Company's Bankers, the National Provincial Bank of England, Limited, Newport (Isle of Wight) Branch.

Tenders must be delivered on or before the 12th of September, 1904.

Payment for the Stock to be made as follows:—On application, 20 per cent. on nominal amount applied for, and the balance on or before the 1st of November, 1904.

The Dividends will be payable half-yearly, and will accrue from the date of payment in full.

By order of the Directors.
FRANK KING,
Secretary.

Newport (Isle of Wight),
August, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

CASES FOR BINDING
QUARTERLY
VOLUMES OF THE "JOURNAL."
(GREEN CLOTH, GILT LETTERED).
Price 2s. each.

WALKER AND WALLSEND UNION GAS COMPANY.

SALE OF £12,000 NEW ORDINARY STOCK.

NOTICE is Hereby Given, that it is the intention of the Directors of the Walker and Wallsend Union Gas Company to SELL BY TENDER, to be received at the Company's Office, Neptune Road, Wallsend-on-Tyne, not later than 2 p.m. on the 9th day of September, 1904,

TWELVE THOUSAND POUNDS OF NEW FIVE PER CENT. ORDINARY STOCK OF THE COMPANY.

The Stock now for Sale is a first issue of Additional Capital under, and subject to, the provisions of the Walker and Wallsend Union Gas Act, 1903. The Standard Rate of Dividend is Five per cent., subject to Sliding-Scale Clauses, under which the authorized rate of dividend payable so long as the present price of the Gas continues, is:—

£6 7s. 6d. PER CENT. PER ANNUM.

The Company has since 1884 paid the full statutory dividends authorized under the Sliding-Scale provisions of the 1884 Act.

Any amount of Stock in multiples of £1 may be applied for. A deposit of £10 per cent. on the nominal amount of Stock applied for must accompany each Tender, and the balance be paid on or before the 30th of September, 1904.

MINIMUM PRICE £130 PER CENT.

The average annual increase of Gas sold during the past Seven Years has been about 8 per cent. The quantity in 1896 was 126,320,000 cubic feet; while in 1903 it was 213,363,000 cubic feet. This rate of increase has been more than maintained during 1904, resulting, in comparison with the corresponding period of 1903, in an increase of 14·71 per cent. for the Half-Year ending June 30.

The number of Consumers on the Company's Books at June 30, 1904, shows an addition to the number at December 31, 1903, of 23·16 per cent.

For Particulars, Forms, and Conditions of Tender, apply at the Office of the Company, Neptune Road Wallsend-on-Tyne.

By order of the Board,
CHAS. H. ARMSTRONG,
Secretary.

Offices: Neptune Road,
Wallsend-on-Tyne, Aug. 5, 1904.

THIRD EDITION, Revised. Fully Illustrated.
Volume I. Price 7s. 6d. net.

THE CHEMISTRY OF GAS MANUFACTURE:

A Handbook on the Production and Purification of Illuminating Gas.

By W. J. ATKINSON BUTTERFIELD, M.A., F.I.C., F.C.S.

GENERAL CONTENTS—Raw Materials for Gas Manufacture. Coal Gas. Carburetted Water Gas. Oil Gas. Enriching by Light Oils. Final Details of Manufacture "THE BEST WORK OF ITS KIND." — *Journal of Gas Lighting.*

The Second and Final Volume, is in active Preparation and will deal with: The Analysis and Testing of Gas; Photometry; Calorimetry; and the use of Gas for Lighting (with and without the aid of Mantles), Heating, and the generation of Power.

ACETYLENE:

The Principles of its Generation and Use. By F. H. LEEDS, F.I.C., F.C.S., Member of the Society of Public Analysts and of the Acetylene Association, and W. J. ATKINSON BUTTERFIELD, M.A., F.I.C., F.C.S. With Diagrams and Illustrations. 5s. net.

LONDON: CHARLES GRIFFIN & CO., LTD., EXETER STREET, STRAND.

Gas Companies are solicited to try Samples of the

MIRFIELD GAS COAL
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

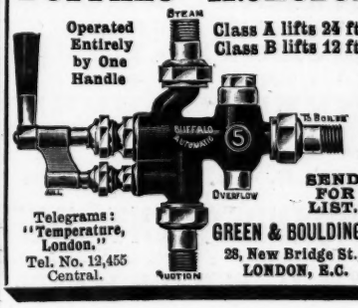
Prices and Analysis on application.

The MIRFIELD (GAS-COAL) COLLIERIES CO.,
RAVENSTHORPE, NEAR DEWSBURY.

'BUFFALO' INJECTOR

Operated Entirely by One Handle

Class A lifts 24 ft.
Class B lifts 12 ft.



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Telegrams: "Temperature, London." Tel. No. 12,455 Central.

GREEN & BOULDING,
28, New Bridge St.,
LONDON, E.C.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

TELEGRAPHIC ADDRESS:— "FITZMAURICE, LONDON." TELEPHONE NO. 11,113 CENTRAL.

ROBERT B. FITZMAURICE,
4, East India Avenue, London, E.C.
Shipping, Insurance, and Chartering Agent for several Foreign Gas Companies, Municipalities, and Gas Plant Manufacturers.
FORWARDS GOODS TO ANY PORT FROM ANY TOWN IN U.K.
Quotations if desired, & Orders promptly executed.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

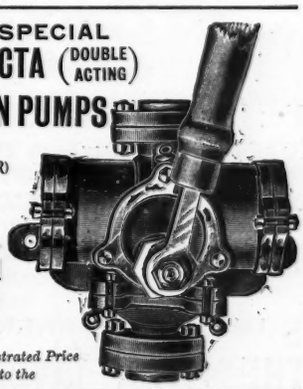
THE GRASSMOOR CO., LD.,
CHESTERFIELD.

JOHN HALL & CO.,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.
RETORTS CAREFULLY PACKED FOR SHIPMENT.

RAILS.
New and Second-Hand with all Accessories; also Tip Waggons and Turntables.

B. M. RENTON,
MIDLAND WORKS,
SHEFFIELD.

SPECIAL
PERFECTA (DOUBLE ACTING) PISTON PUMPS
(HAND OR POWER) FOR
Tar and Ammoniacal Liquor, &c.



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Now Ready, pp. 584 & XVI. *251 Illustrations.* *F'Cap. Quarto, Price 18s. net (Post Free),*

THE SEVENTH EDITION OF

NEWBIGGING'S HANDBOOK

FOR GAS ENGINEERS & MANAGERS

(DEDICATED TO SIR GEORGE LIVESEY).

The Work has been revised throughout, and contains 40 pages of Letterpress and 12 Illustrations more than the last Edition.

In almost every department additions have been made; and it is believed that the labour bestowed on its production will enhance the value of the book as a Work of Reference.

Orders may be sent through any Bookseller, or direct to the Publisher,

WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

TROTTER, HAINES, & CORBETT, LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
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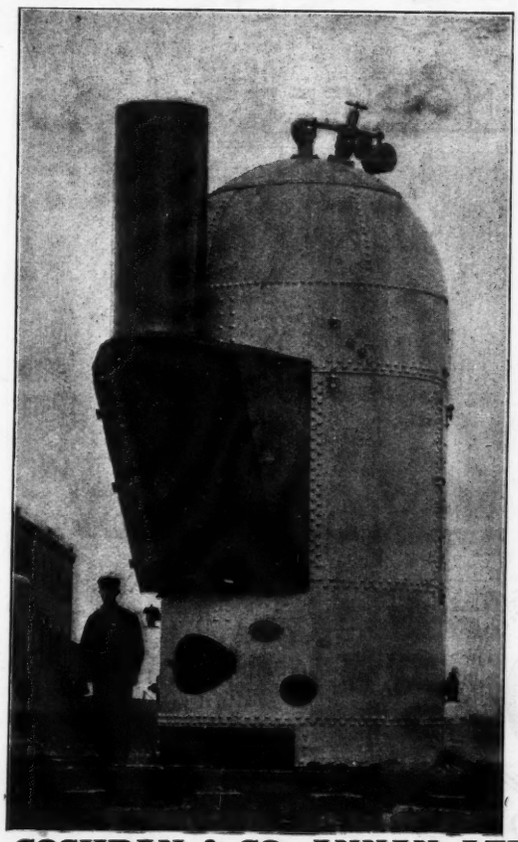

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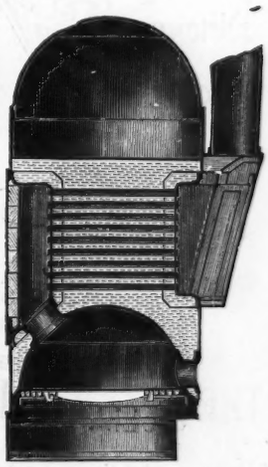

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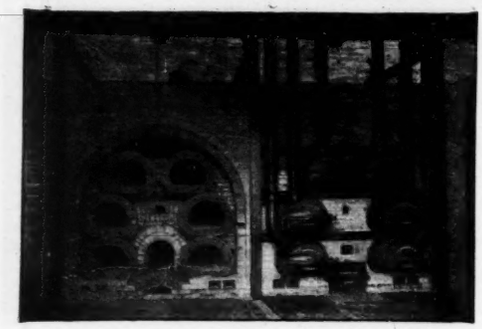

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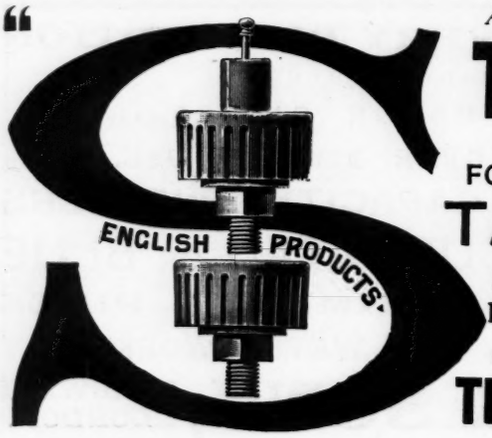

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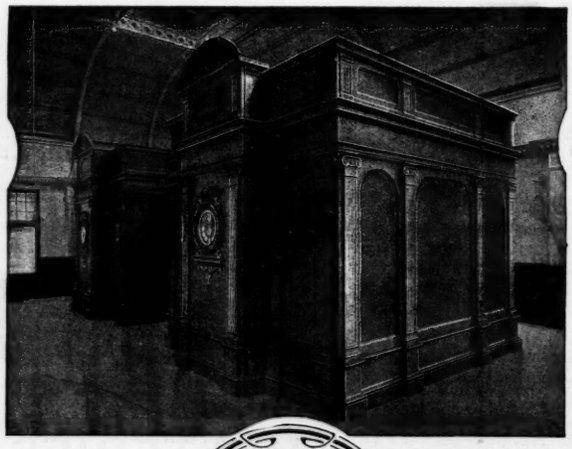

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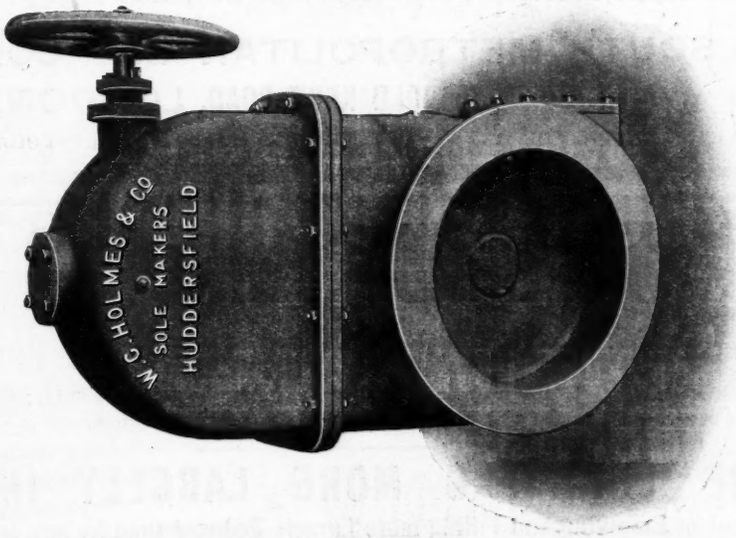

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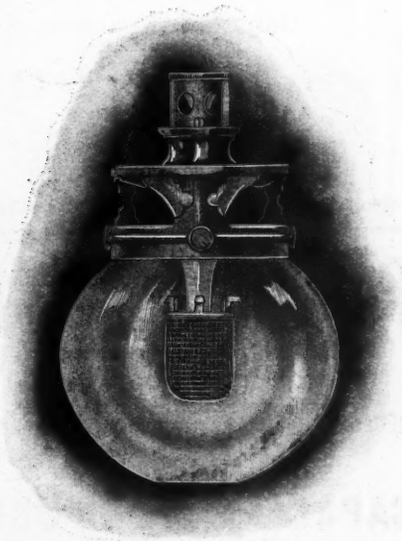

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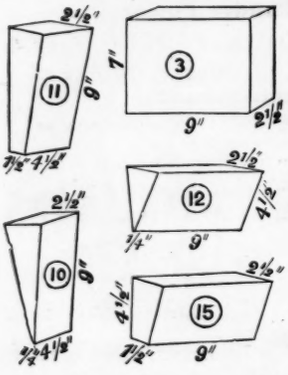

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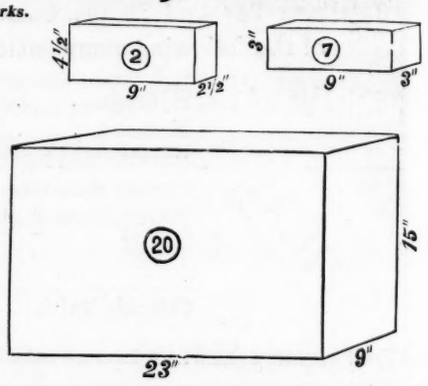

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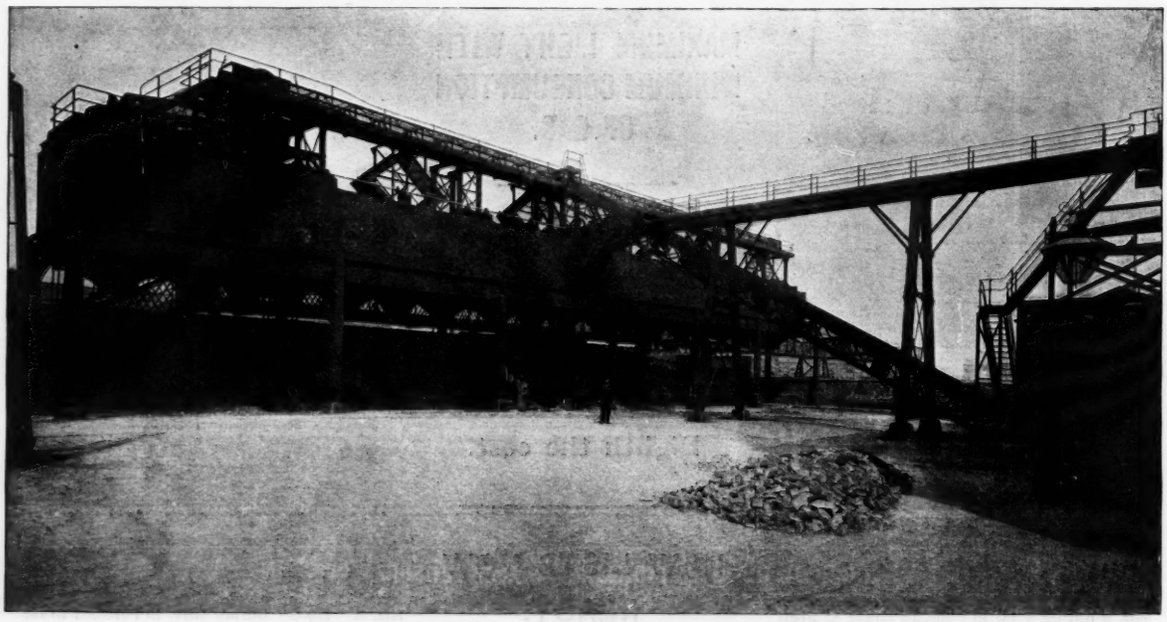

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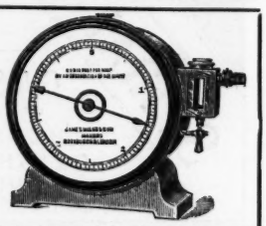

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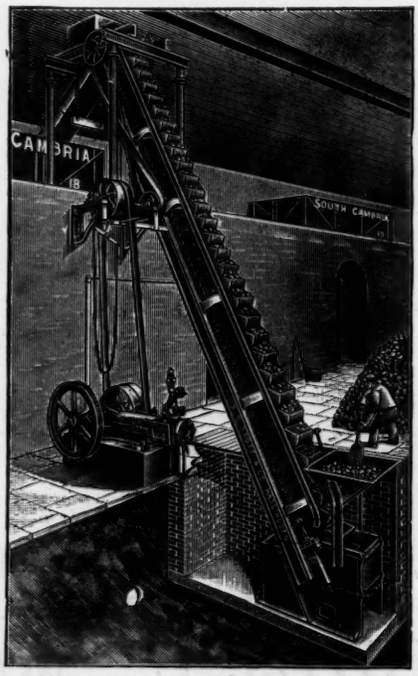

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